INDIA

R WORLD

AL & SYNTHETIC

DECEMBER, 1943

TECHNOLOGY DEPT.

★ ★

To our 280 Employees in the Armed Forces . . . and to all of yours

A

Cheerful Christmas

and

A Safe and Speedy Homecoming

Godfrey L. Cabot, Inc.

Boston

★ ★

A BILL BROTHERS PUBLICATION

Newsletter No. 12
DECEMBER, 1943

Published by Rubber Chemicals Division of DU PONT

FLAME RESISTANCE OF NEOPRENE AN ADDED ADVANTAGE

THE present very large use of neoprene, including GR-M, by the rubber industry means that many articles and assembly parts are now flame resistant and, therefore, safer to employ. Neoprene will burn but *only* so long as a supporting flame is present. It is highly flame resistant, due, of course, to the substantial amount of chlorine chemically combined in it. This safety factor cannot be overstressed and is always present in neoprene products even though the products are used because of oil resistance or some property other than flame resistance. This is especially true in airplane parts, insulated wire and cable, crash pads, ship accessories and many other products that are being made of neoprene.

All types of neoprene are about equally flame resistant in similar formulations. Obviously, flame resistance is not different from any other property in that it will vary in degree in neoprene compositions depending on what compounding ingredients are incorporated in them. For the most flame resistant compounds, flammable ingredients should be avoided and fillers like antimony oxide, magnesium carbonate and clay should be used. Conventional amounts of the usual softeners may be used without appreciable detraction from flame resistance. However, practically any neoprene compound that might be employed is more flame resistant than a rubber compound.

TESTS Flame resistance is determined by the Du Pont Vertical Tube method which consists of suspending a 6-inch strip of the test material in a glass chimney over a Bunsen flame and noting the time required to burn the strip. If the strip is not completely burned because the flame from the burning sample extinguishes itself, the distance burned as well as the burning time is recorded.

When rubber, GR-S and neoprene strips, compounded similarly and to the same extent, are tested by this method, results similar to those shown at right are obtained:

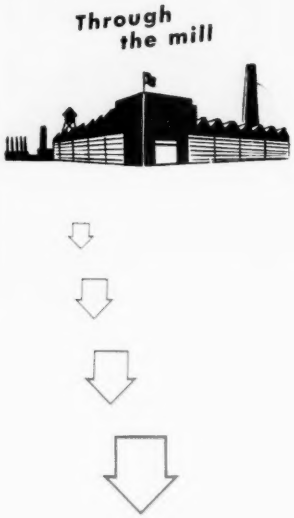
	Rubber	GR-S	Neoprene
Original length of sample—inches	6	6	6
Burning time—seconds	35	40	300
Inches consumed	6	6	3
Inches burned per minute	10.3	9	0.6

The full difference in flame resistance between rubber and neoprene is not shown by these data, since they do not reflect the fact that the neoprene sample actually stopped burning in 5 minutes or less when only half of the test strip was consumed by the flame. Only so long as the Bunsen flame was in contact with the strip did it burn, whereas the rubber and GR-S strips, after being ignited, burned vigorously to completion.

FLAME RESISTANT SPONGE Due to its cellular structure, sponge rubber burns much more rapidly than solid, non-porous rubber. Because of this, the vertical burning test method referred to at left is too severe for measuring accurately the burning rate of such material. In testing sponge, therefore, we have used a method in which the test sample is held horizontally with the Bunsen flame touching one end and noting the time for the flame to travel one inch, or less if it extinguishes itself before an inch of sample is consumed. Using this test, sponge samples made of rubber latex and neoprene latex were compared. The samples contained curing agents but no loading and and were as near "pure gum" as possible in a vulcanized product.

	LATEX SPONGE	
	Rubber	Neoprene
Density—grams per c.c.	0.23	0.20
Sample size—cross section—inches	0.5 x 0.5	0.5 x 0.5
Burning time—seconds	10.0	16.0*
Length consumed—inches	1.0	0.125
Inches burned per minute	6.0	0.47

*Flame went out at end of 16 seconds; only 0.125" burned



RETURN THOSE METAL DRUMS

Metal drums are scarce and permission to purchase new ones cannot be obtained unless a high percentage of returned used ones can be proven. It is important that those in which neoprene latex is shipped be returned promptly if containers for additional shipments are to be made available.

Please do not use neoprene latex drums for other purposes. Rinse them out and return them promptly. Ceiling prices for returned drums are paid and return freight charges east of the Mississippi River are allowed.

DU PONT
REG. U.S. PAT. OFF.
RUBBER CHEMICALS DIVISION
BETTER THINGS FOR BETTER LIVING . . . Through Chemistry

INDIA RUBBER WORLD, December, 1943, Vol. 109, No. 3. Published monthly by BILL BROTHERS PUBLISHING CORP., 1309 Noble Street, Philadelphia 23, Pa. Editorial and advertising offices, 386 Fourth Avenue, New York 16, N. Y., U. S. A. Entered as second-class matter October 5, 1889, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription, United States and Mexico, $3.00 per year; all other countries, $4.00; single copies, 35 cents.

WHY YOU SHOULD TRY WITCO HYDROCARBON (M.R.)

You'll get these excellent results with WITCO HYDROCARBON (M. R.) in compounding GR-S: increased resistance to cracks due to flexing; more plasticity in the uncured stock, easier processing and increased tensile strength.

And for additional efficiency and economy in processing GR-S, WITCO SOFTENER NO. 20 will save milling time, and produce a softer mixed stock. Samples of WITCO M. R. and WITCO SOFTENER NO. 20 will be sent to you promptly upon request to our nearest sales office.

WISHNICK-TUMPEER, INC.

MANUFACTURERS AND EXPORTERS

New York 17, 295 Madison Ave. • Boston 9, 141 Milk St. • Chicago 11, Tribune Tower • Cleveland 14, 616 St. Clair Avenue, N. E. • Witco Affiliates: The Pioneer Asphalt Company • Panhandle Carbon Company
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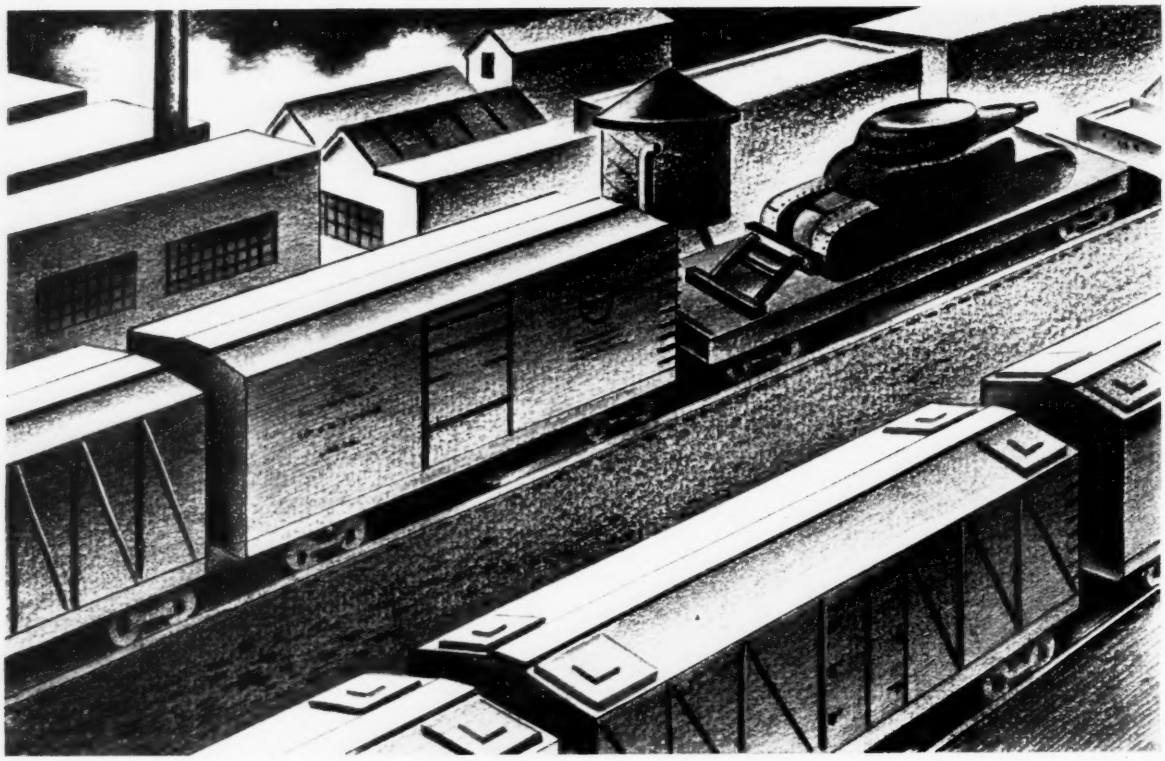

HANDLING VITAL WAR WORK

Choosing appropriate "finishes" for the Axis is our particular war job. We create handsome finishes for instruments of death . . . not to make our enemies happier, but to protect these messengers of destruction on their appointed errands.

Finishes are playing a vital role in the war . . . preventing corrosion . . . protecting against deterioration . . . intervening against abrasion . . . safeguarding against exposure to air, sea, acid, smoke, humidity, torrid heat, below zero cold. Stanley chemists have developed hundreds of finishes for special purposes.

Finishing may not have occurred to you as a "problem" . . . but if you could see what is being done TODAY you would agree that, when the war is won, your present product finish may be as extinct as the dodo bird.

Stanley chemists . . . experts in this field . . . can show you how to improve your product by improving its finish. Your inquiry incurs no obligation. Address The Stanley Chemical Company . . . manufacturers of Stanley Lacquers, Enamels, Synthetics and Japans . . . East Berlin, Connecticut.

Stanley Chemical

THE ACCELERATOR YOU NEED FOR YOUR PRODUCT IS IN THE NAUGATUCK LINE

- *TIRES - CAMELBACK*
  BJF-MBT-MBTS
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  MONEX-BEUTENE
- *FOOTWEAR and PROOF GOODS*
  MONEX-PENTEX
- *MECHANICALS*
  MONEX-PENTEX
  BEUTENE-TRIMENE BASE
- *WIRE*
  MORFEX "33" and "55"
- *LOW TEMPERATURE CURES*
  ZBX-CPB with DBA

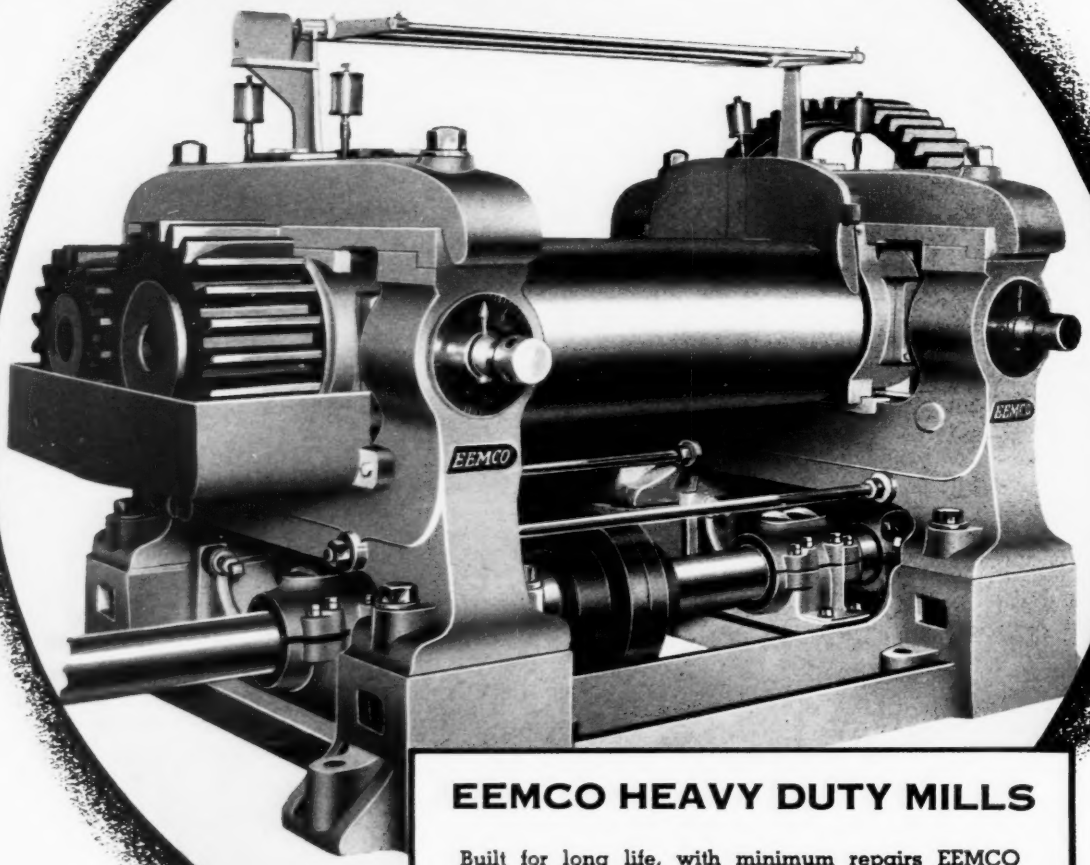
PROCESS - ACCELERATE - PROTECT with Naugatuck Chemicals

Naugatuck Chemical

DIVISION OF UNITED STATES RUBBER COMPANY
ROCKEFELLER CENTER NEW YORK 20, N. Y.

IN CANADA: *Naugatuck Chemicals Limited, Elmira, Ont.*

MILLS



EEMCO HEAVY DUTY MILLS

Built for long life, with minimum repairs EEMCO mills are made in various sizes from the 12 inch laboratory mill up to and including 84 inch mill. Correctly designed, carefully constructed and sturdy EEMCO mills are unusually strong in the parts subject to heavy strains. Write to EEMCO for details, no matter what your rubber working requirements may be.

Send for our latest catalog, just off the press.

Manufacturers of REFINERS - TUBERS - EXTRUDERS - STRAINERS
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EEMCO *ERIE ENGINE & MFG. CO.*

SUCCESSOR TO "NAGLE"

953 EAST 12th ST., ERIE, PENNA.

Announcing another

Hycar Price Reduction

FOR the third time in two years the prices of Hycar synthetic rubber have been reduced, maintaining our policy of passing on to industry the savings we have been able to make by steadily increasing production and operating economies through more efficient operations.

Hycar OR-15, for example, has been reduced from 77c to 70c to 63c and is now reduced again. The prices of all other Hycar products are also lower by about 10%.

Price Schedule

EFFECTIVE NOVEMBER 1, 1943

	Price per lb. Standard 100 lb. Containers	Price per lb. Less than Standard Container	Specific Gravity
Hycar OR-15	**$0.56**	**$0.72**	**1.00**
Hycar OR-25	**0.50**	**0.66**	**0.98**
Hycar OS-10	**0.50**	**0.66**	**0.98**

Prices are net and F. O. B. Akron, Ohio

Hycar is currently as critical as ever, but due to its importance in solving many difficult problems WPB now permits shipments up to 25 pounds per month, for experimental purposes, without allocation. Our Customer Service Laboratory is always ready to work with you, without cost, in your experimental work. *Hycar Chemical Company, Akron 8, Ohio.*

Hycar

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

Laboratory Research

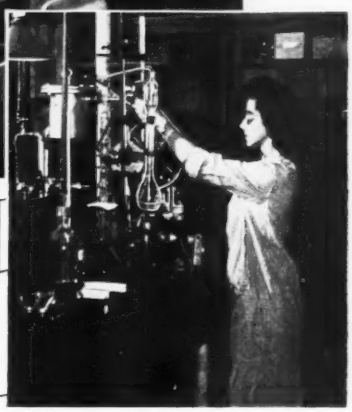
Our laboratories are located at the point of zinc oxide production. Here, research and development are consistently carried out to give consumers the benefits of improved or newly developed zinc oxides. The information so gained serves as a storehouse of technical data of great value to consumers in solving pigment problems.

A highly important function of our laboratory staff is the applied research conducted towards the improvement of processes within our plant, and toward maintaining the widely recognized quality and uniformity of ST. JOE Lead-Free ZINC OXIDES.

ST. JOSEPH LEAD COMPANY

250 PARK AVE., NEW YORK, N. Y.

MADE BY THE LARGEST PRODUCER OF LEAD IN THE UNITED STATES



CONSTANT CONTROL

assures the Purity and Uniformity of NAFTOLEN

REG. U. S. PAT. OFFICE

We know that the quality of *your* product depends upon the quality of our product. Therefore, from raw material to finished product, constant control is maintained. There is no room for guesswork. In the plant and in the laboratory, NAFTOLEN is checked and tested again and again to insure its purity and uniformity.

You can rely on NAFTOLEN to give you uniform results—not only today—but also tomorrow.

WILMINGTON CHEMICAL CORPORATION

10 East 40th Street **New York 16, N. Y.**

Plant and Laboratory: *Wilmington, Delaware*

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C=C

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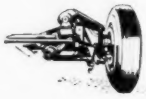
BARDOL* in GR-S . . . *Tests have shown that Bardol is completely compatible with GR-S (Buna S), processing readily. It functions as a wetting agent and is also an effective plasticizer.*

. . . Bardol promotes dispersion of sulphur and accelerators in the elastomer, thereby improving behavior and performance of the compounds. Users have found that when incorporated in appropriate amounts, Bardol contributes to:

GREATER RESILIENCE ***AND LOWER HYSTERESIS***

IMPROVED RESISTANCE TO ABRASION

HIGH TENSILE STRENGTH AND ELONGATION

LOW PERMANENT  ***AND COMPRESSION SET***

FLEXIBILITY AT LOW TEMPERATURES, RESULTING IN

GREATER RESISTANCE ***TO PLY SEPARATION.***

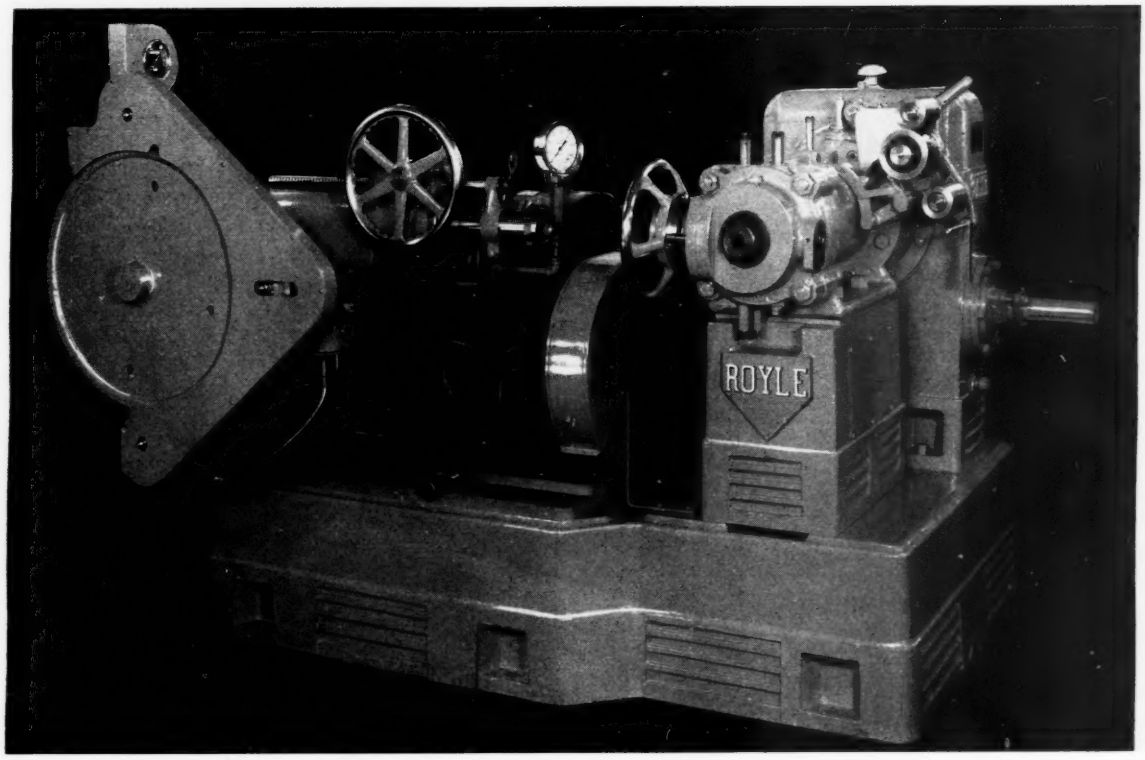
For complete details, wire or write

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N.Y

*Reg. U. S. Pat. Off.

ONE OF AMERICA'S GREAT BASIC BUSINESSES...

Barrett



No. 2 Royle Continuous Vulcanizing Insulator

IT TAKES A LOT OF "KNOW HOW" TO MEET WAR-TIME RUBBER DEMANDS...

It took more than an adequate supply of synthetic substitutes to assure the Allied Armed Forces sufficient rubber to take the offensive on all fronts . . . . . It took the ingenuity and experience of the rubber industry to plan and to execute imagination staggering production schedules . . . . . It took dependable, efficient machines to process these materials into effective weapons of war.

John Royle & Sons—progressive pioneers since 1880 in the manufacture of extrusion machinery—are proud of the part Royle equipment is playing in this crucial battle.

ARMY (E) NAVY

JOHN ROYLE & SONS

ROYLE PATERSON N. J.

PIONEER BUILDERS OF EXTRUSION MACHINES SINCE 1880

PATERSON 3, NEW JERSEY

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Represented by J. C. CLINEFELTER
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(MACHINERY) LTD.

PELLETEX & GASTEX
at Work for Uncle Sam

Most important and effective is the contribution to victory made by PELLETEX & GASTEX Semi-Reinforcing Furnace Blacks in combating the destructive forces of solvents. Compounds of these leading black pigments are present not only in the hose used to load gasoline and crude oil aboard the tanker but also in the gaskets of the couplings and in the valves of the pump.

For oil hose these leading blacks are pre-eminent and for fifteen years have been used by practically all rubber manufacturers.

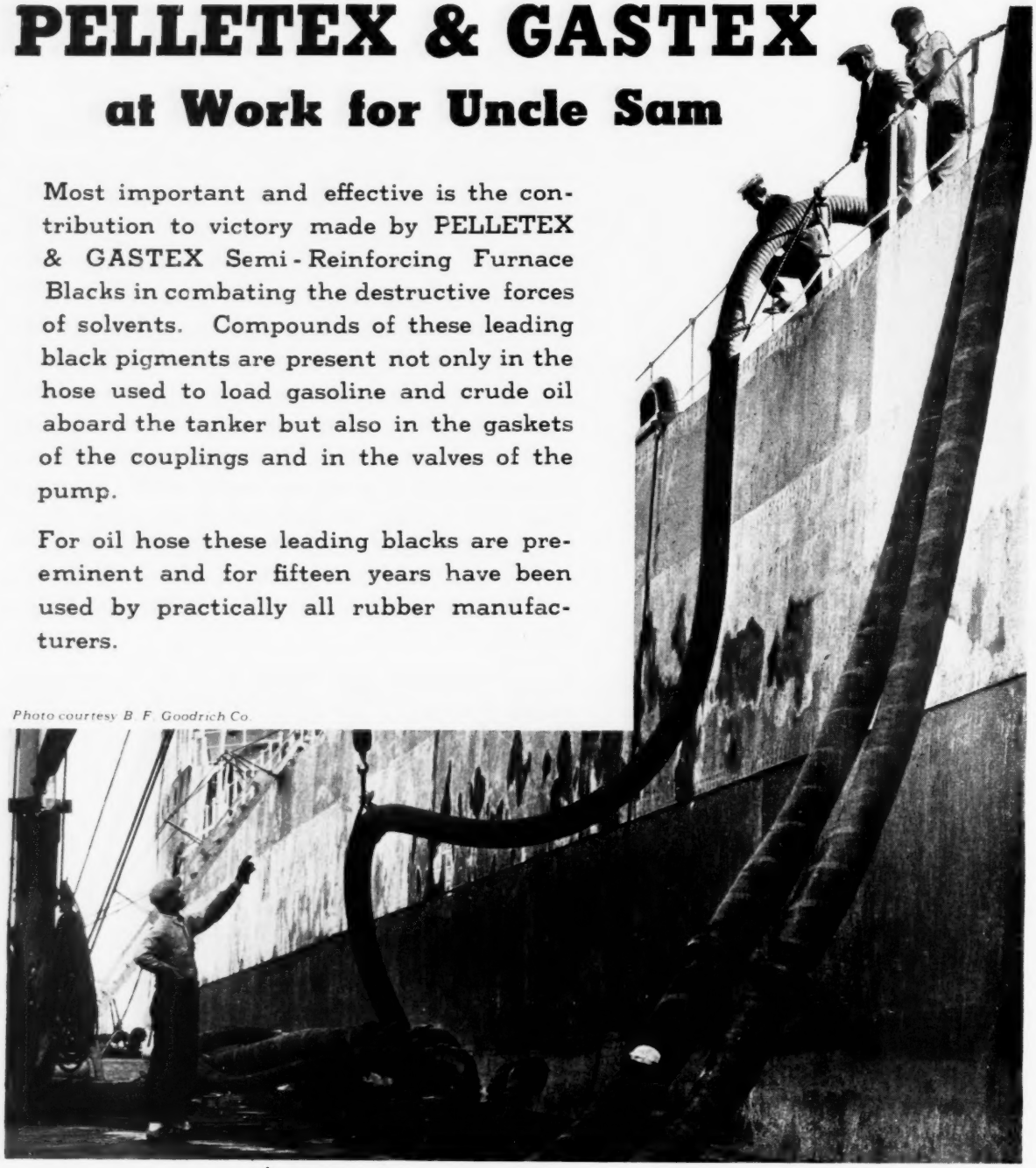

Photo courtesy B. F. Goodrich Co.

HERRON BROS. & MEYER

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GASTEX TRADE MARK

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GENERAL ATLAS CARBON DIVISION

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PELLETEX TRADE MARK

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ST. LAWRENCE CHEMICAL CO., LTD., Toronto - Montreal

TO THE RESCUE OF WAX USERS

The new, modern manufacturing plant of our affiliate, Western Wax Company, is ready to fill your wax requirements.

WIRE • PHONE • WRITE

Warwick Wax Co., Inc.

580 FIFTH AVENUE, NEW YORK CITY

A Subsidiary of Warwick Chemical Company

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Impregnole Water Repellent • Luminous Pigments • Metallic Stearates • Metallic Resinates
Petroleum Waxes • Sulfated Oils • Synthetic Detergents • Textile Compounds • Wetting Agents

NEVILLE

NEVOLL*

GR-S Synthetic Rubber Softener

*REG. U. S. PAT. OFF.

● NEVOLL*, a coal-tar softener, is finding considerable use as a softener and plasticizer for the new GR-S (Buna S) synthetic rubber.

● It meets the Rubber Reserve Company's Contract Specification for coal-tar softener dated Nov. 21, 1942.

● NEVOLL* is currently quite readily available for prompt shipment in tank cars and drums.

Ask for a sample and further information from us or our agents

THE NEVILLE COMPANY

PITTSBURGH · PA.

Chemicals for the Nation's War Program

NEVILLE SALES AGENTS TO THE RUBBER INDUSTRY

U. S. A. (other than Mass. and R. I.), Canada, Mexico

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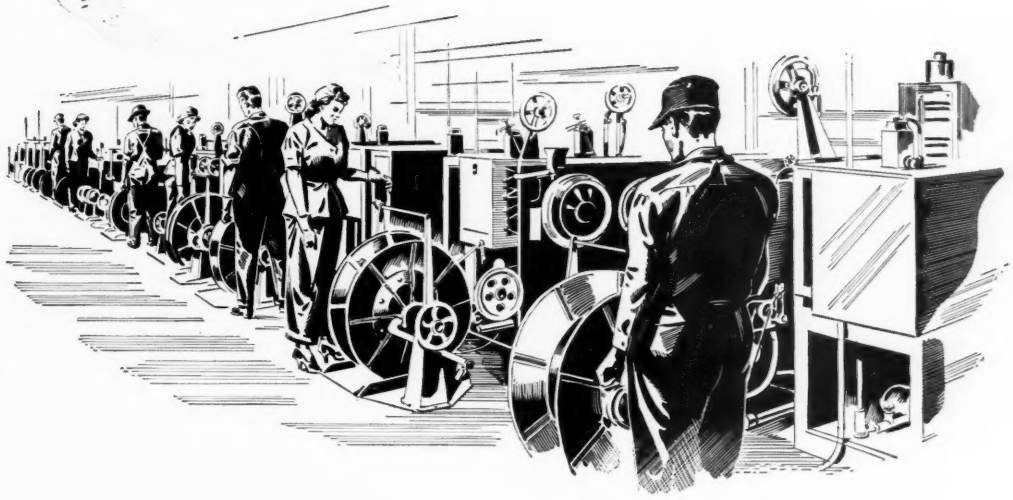
T. C. ASHLEY & CO.
683 Atlantic Ave., Boston, Mass.

R-8

There's RUBBER DUST in our wire-drawing room



NATIONAL-STANDARD devotes so much of its wire production to the rubber industry that the term "rubber dust" is familiar even to the men in our wire-drawing rooms. We've worked with tire engineers in producing better bead wire, braids and tapes; with mechanical goods men on new uses for wire in flat and V-belts and braiding for hose; with aviation experts on improving the performance of non-skid tires and de-icers, with wire.

We don't think for a minute that all the uses for wire with rubber have been explored. We're constantly working on new ideas and we know that you are too. If you've got a problem to solve, perhaps our experience and research facilities can help. We try to make National-Standard the kind of place where you'll get the quickest answers, most helpful service, and the very best wire it is possible to produce.

★ ★ NATIONAL STANDARD Company ★ ★

Divisions of National-Standard Company

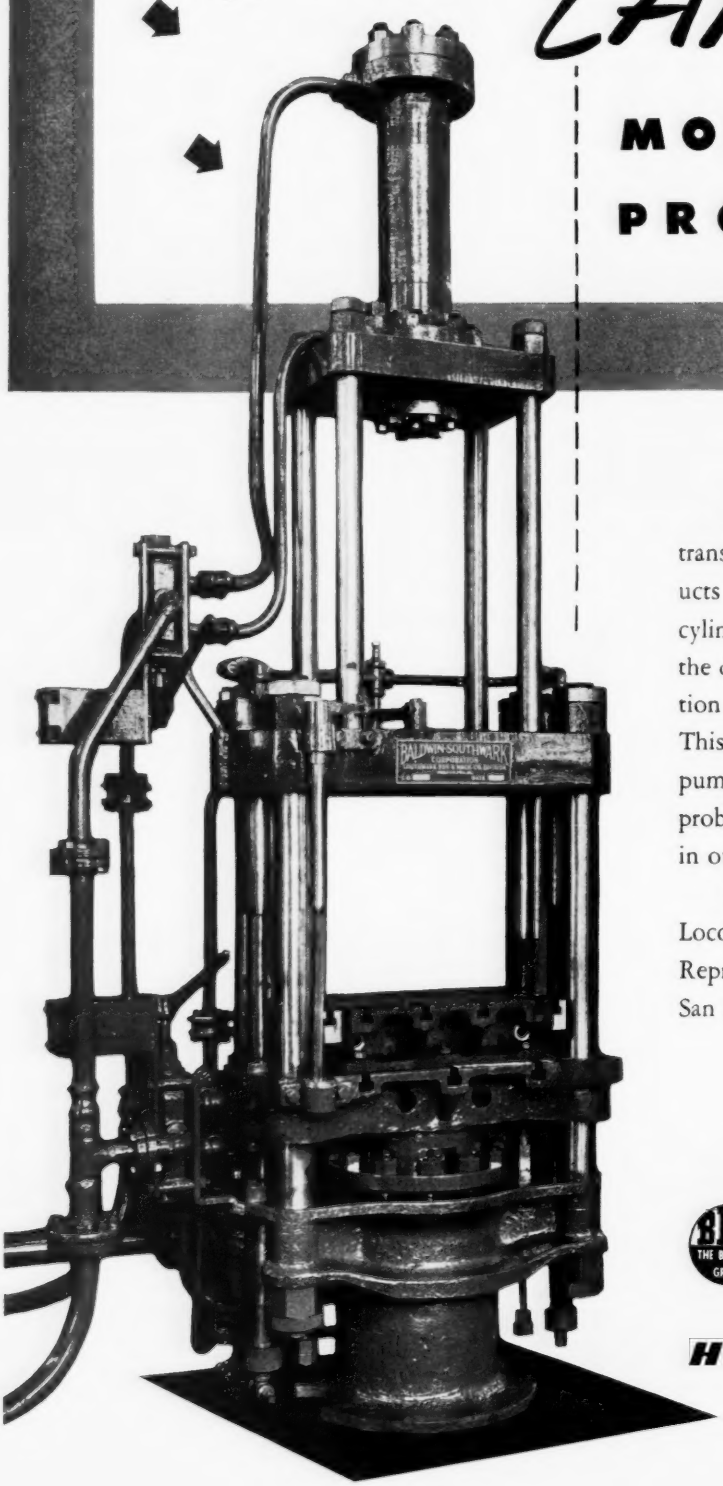
NATIONAL-STANDARD
Niles, Mich.
TIRE WIRE, FABRICATED BRAIDS AND TAPE

WAGNER LITHO MACHINERY
Hoboken, N. J.
LITHOGRAPHING AND SPECIAL MACHINERY

ATHENIA STEEL
Clifton, N. J.
FLAT, HIGH-CARBON STEEL

WORCESTER WIRE WORKS
Worcester, Mass.
ROUND STEEL WIRE, SMALL SIZES

FOR LARGE MOULDED PRODUCTS



Here Southwark presents a semi-automatic transfer moulding press for large moulded products of Thermo-setting materials. The lower cylinder gives ample clamping pressure to keep the dies closed thereby resisting the high injection pressure created by the upper cylinder. This press is also available with a self-contained pumping unit. Usual or unusual equipment problems are all the same to Southwark. Call in our specialists.

Baldwin Southwark Division, The Baldwin Locomotive Works, Philadelphia; Pacific Coast Representative, The Pelton Water Wheel Co., San Francisco.

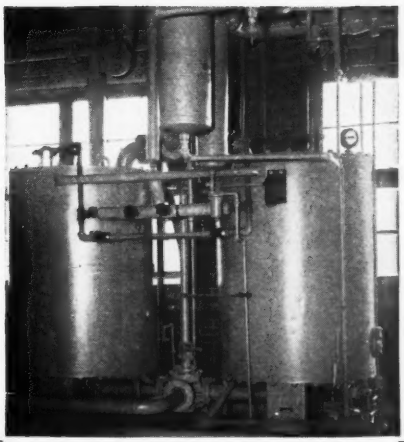
BLW THE BALDWIN GROUP

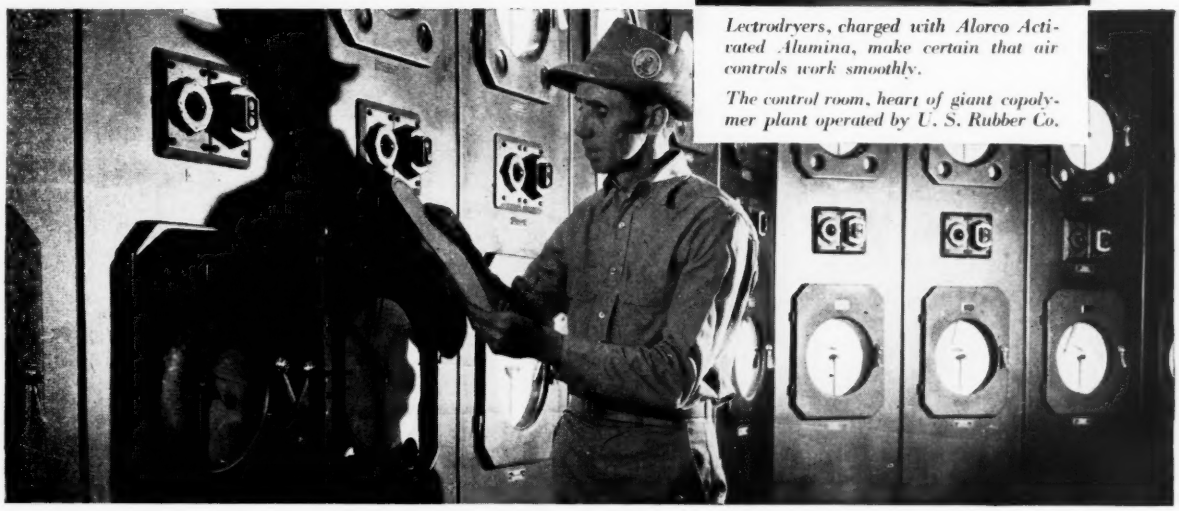
BALDWIN
SOUTHWARK
HYDRAULIC PRESSES

Because

exact control is imperative, they keep air lines DRY with

Activated Alumina





Lectrodryers, charged with Alorco Activated Alumina, make certain that air controls work smoothly.

The control room, heart of giant copolymer plant operated by U. S. Rubber Co.

Synthetic rubber production calls for extremely accurate control of conditions under which reactions take place; the process is very sensitive to temperature and pressure variations. An air system provides the required close modulations of control.

Policing these air lines, keeping them free of moisture, are Lectrodryers charged with Alorco Activated Alumina. No chance that water in the lines will team up with dust to form sludge that will clog tiny valve ports. No rusting or freezing to interfere with the smooth operation of sensitive instruments.

Elsewhere in this plant, similar machines charged with Activated Alumina are drying inert gases used in the rubber-making processes. Difficult reactions are more likely to follow narrow channels when materials have definite dryness.

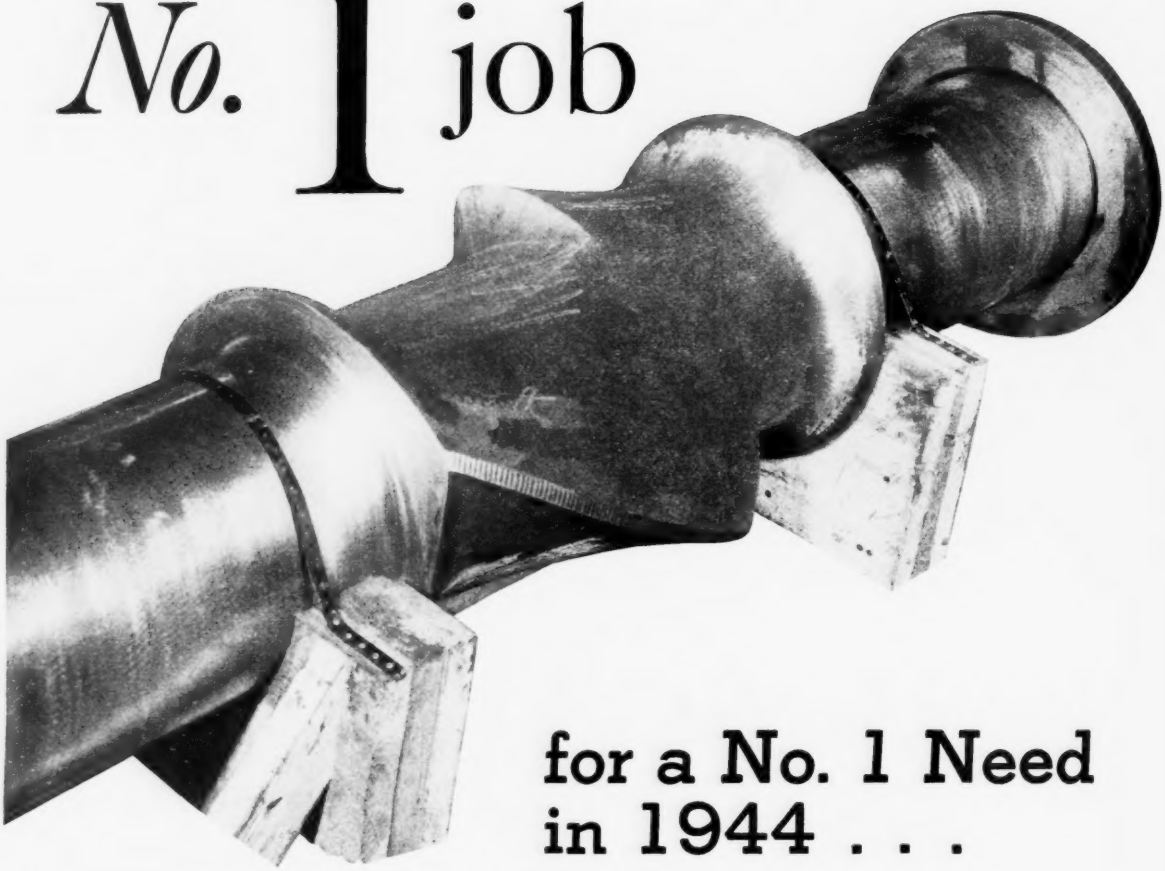
Do you need a drying agent which will remove every trace of moisture to dew points below −110° F.? That's the kind of job Alorco Activated Aluminas are doing with organic liquids, air and gases. For help, write ALUMINUM COMPANY OF AMERICA (*Sales Agent for* ALUMINUM ORE COMPANY) 1909 Gulf Building, Pittsburgh, Pennsylvania.

"ALORCO" ALORCO PRODUCTS

Reg. U.S. Pat. Off.

ACTIVATED ALUMINAS

No. 1 job



for a No. 1 Need in 1944 . . .

SPARE PARTS URGENTLY NEEDED!

Do you have spare Banbury parts? You can help someone else by letting us buy them. They are urgently needed.

First things should come first . . . The Number 1 job in 1944 is to process Synthetic rubber fast enough and in volume enough to meet the requirements for finished goods . . . Banburys must play a part of Number 1 importance in this program . . . Your Banburys should be ready now to meet this obligation to assure efficiency —fast, effective Synthetic processing continuously without interruption . . . Redesigning and rebuilding Banburys to put them in Number 1 condition for meeting this Number 1 job is a service we are particularly skilled to give. If your Banburys aren't ready for the Number 1 job write, wire or phone us today.

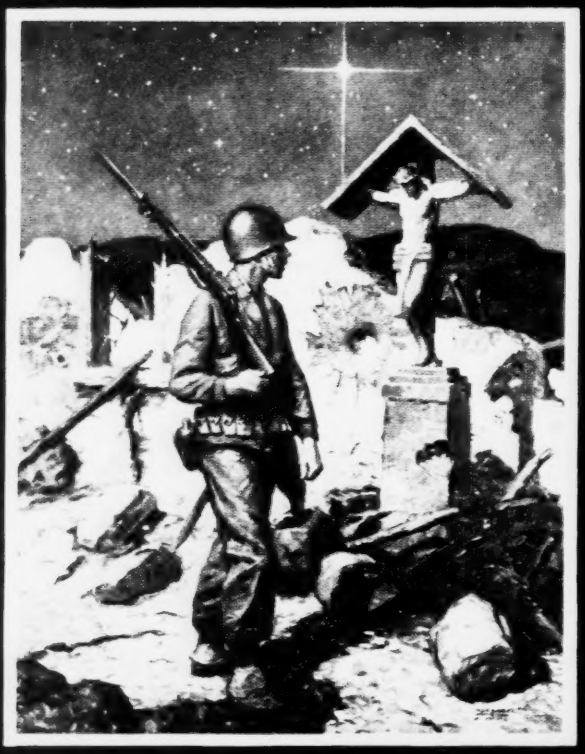
SERVING THE IWS RUBBER INDUSTRY

INTERSTATE WELDING SERVICE

Main Plant: 914 Miami Street . . . AKRON 11, OHIO . . . Phone: JE 7970

EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

"It Came Upon a Midnight Clear"



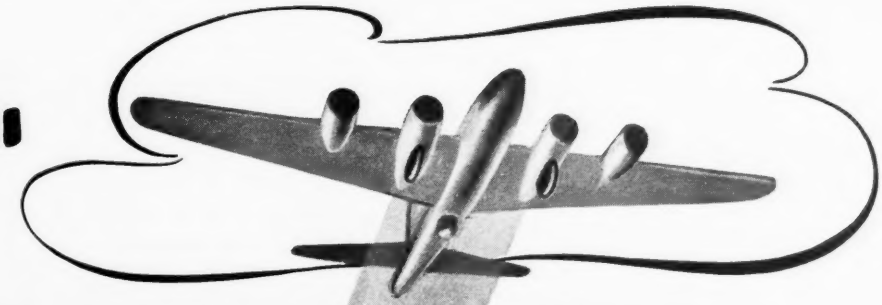
Wishing you a Christmas replete with the
Spirit of Human Kindliness

And a New Year rich with opportunities
to serve your fellow man.

UNITED CARBON CO. Inc.

Charleston, W. Va.

New York • Akron • Chicago



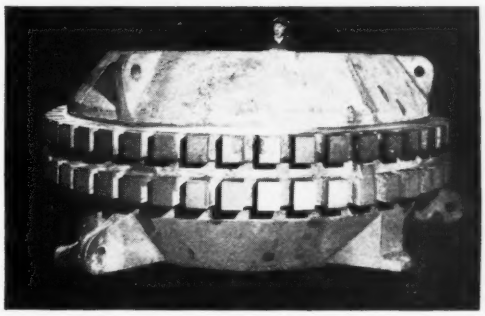
110" DIAMETER TIRES molded in 60,000 lbs. of Meehanite

THIS thirty-ton mold was made by our Ansonia plant for a leading rubber company for producing 110" diameter airplane tires. Each of these giant tires weighs 1800 pounds.

Process GM Meehanite was selected for this mold because of its superior physical properties, which give it high strength, close-grained structure and free machinability. In a mold such as this, the material must be very close-grained, with all surfaces absolutely free of imperfections, so that the rubber, after vulcanization, will have a smooth, even surface.

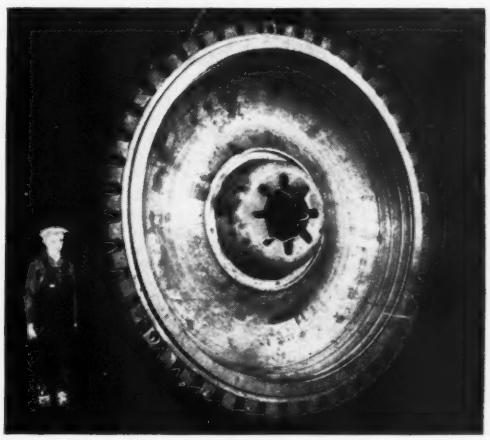
Made by the Randupson cement process of molding, each of the two 15-ton castings making up the mold were poured and all machine work done at our Ansonia plant. After cleaning, and before machining, the castings were heat-treated to eliminate possible residual casting stresses.

This is an example of Farrel-Birmingham facilities for producing those unusual jobs requiring engineering ability and manufacturing capacity somewhat out of the ordinary. When you have a problem involving rubber production equipment you may find these facilities useful.



Above—This mold for giant airplane tires is one of the largest tire molds ever made.

Below—Each half of the mold weighs 15 tons and is 10 feet outside diameter.



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Left—Machining the lower half of the mold in Farrel-Birmingham Ansonia plant.

FARREL-BIRMINGHAM COMPANY, INC.

ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y. — Branch Offices: New York, Buffalo, Pittsburgh, Akron, Los Angeles

REMEMBER?...

Then TITANOX pigments gave unexcelled whiteness and brightness to all types of rubber products.

Today they do the same wherever white, natural or synthetic rubber stocks are desired.

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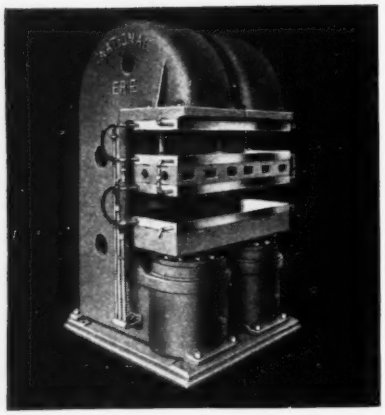

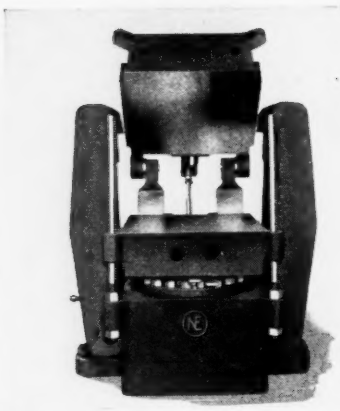

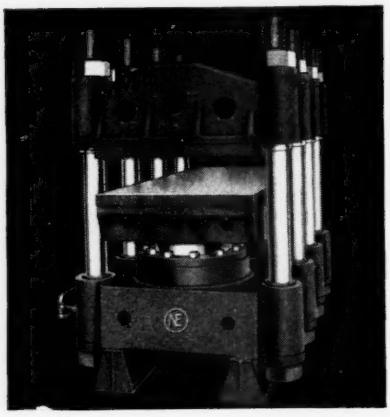

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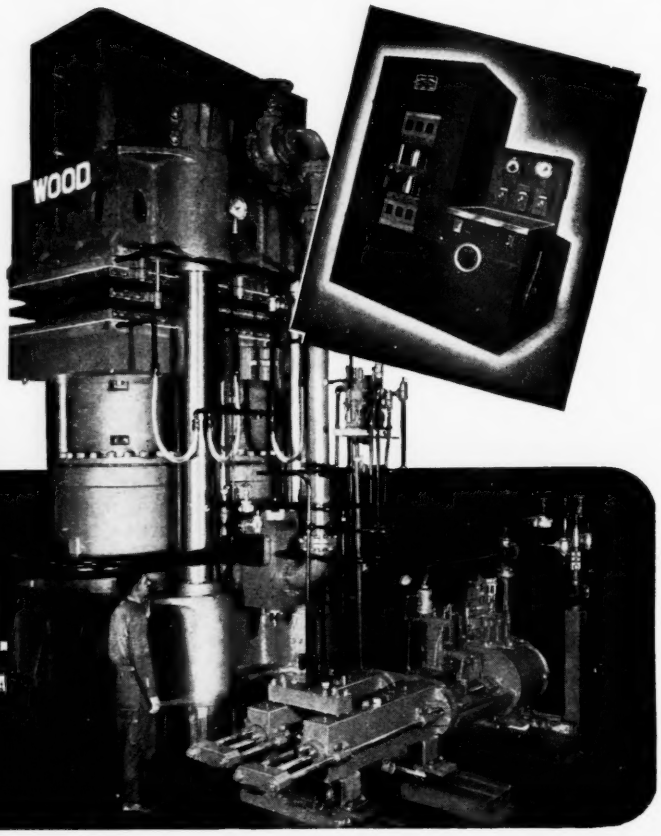

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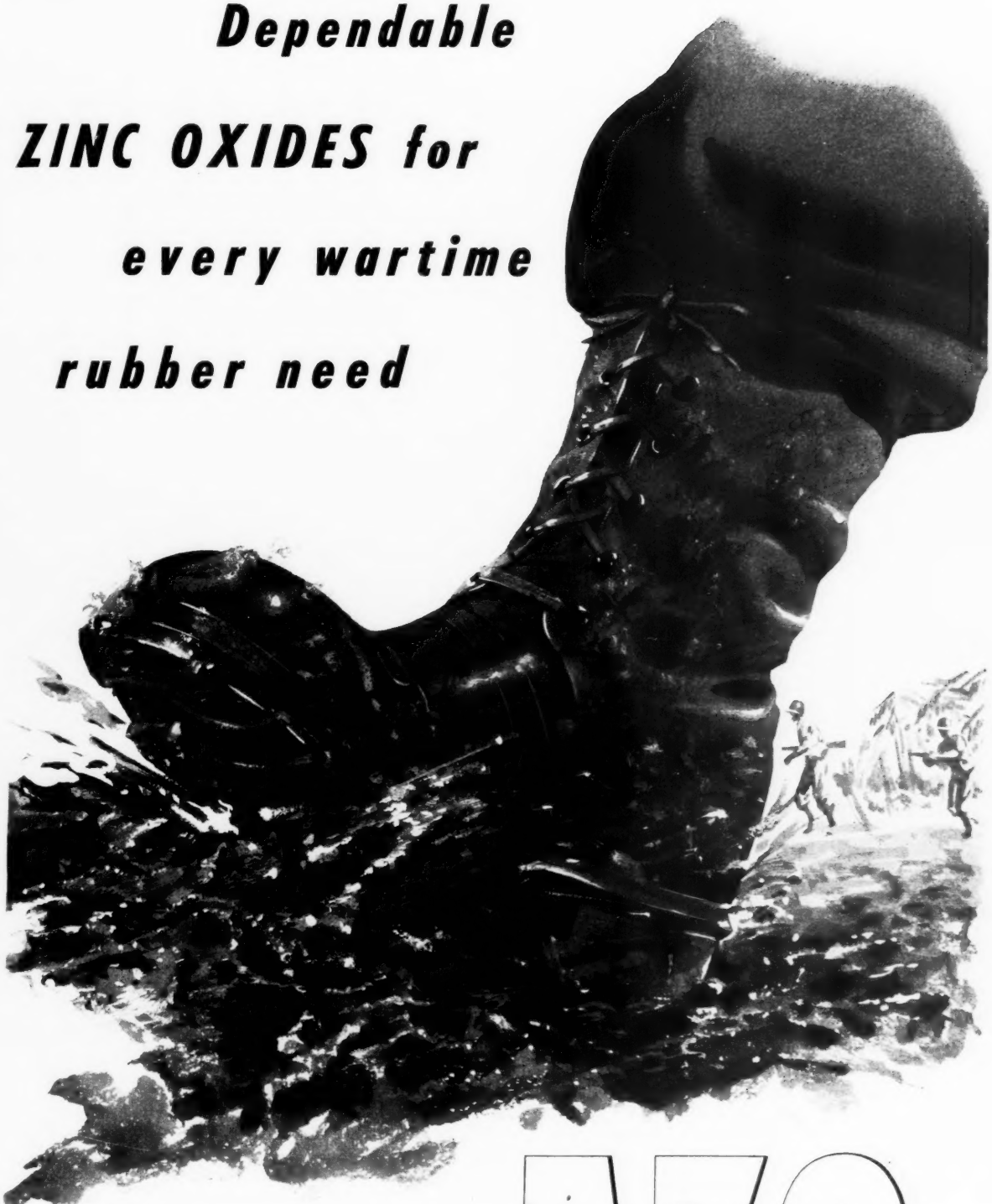

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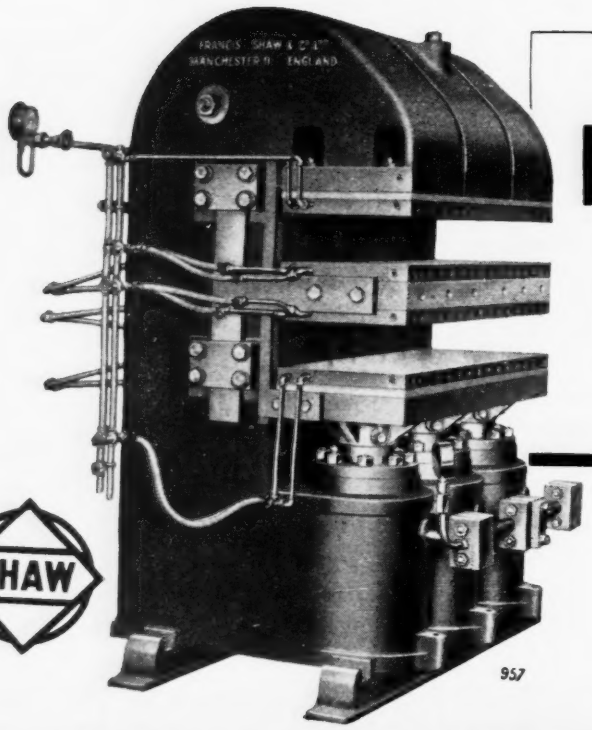

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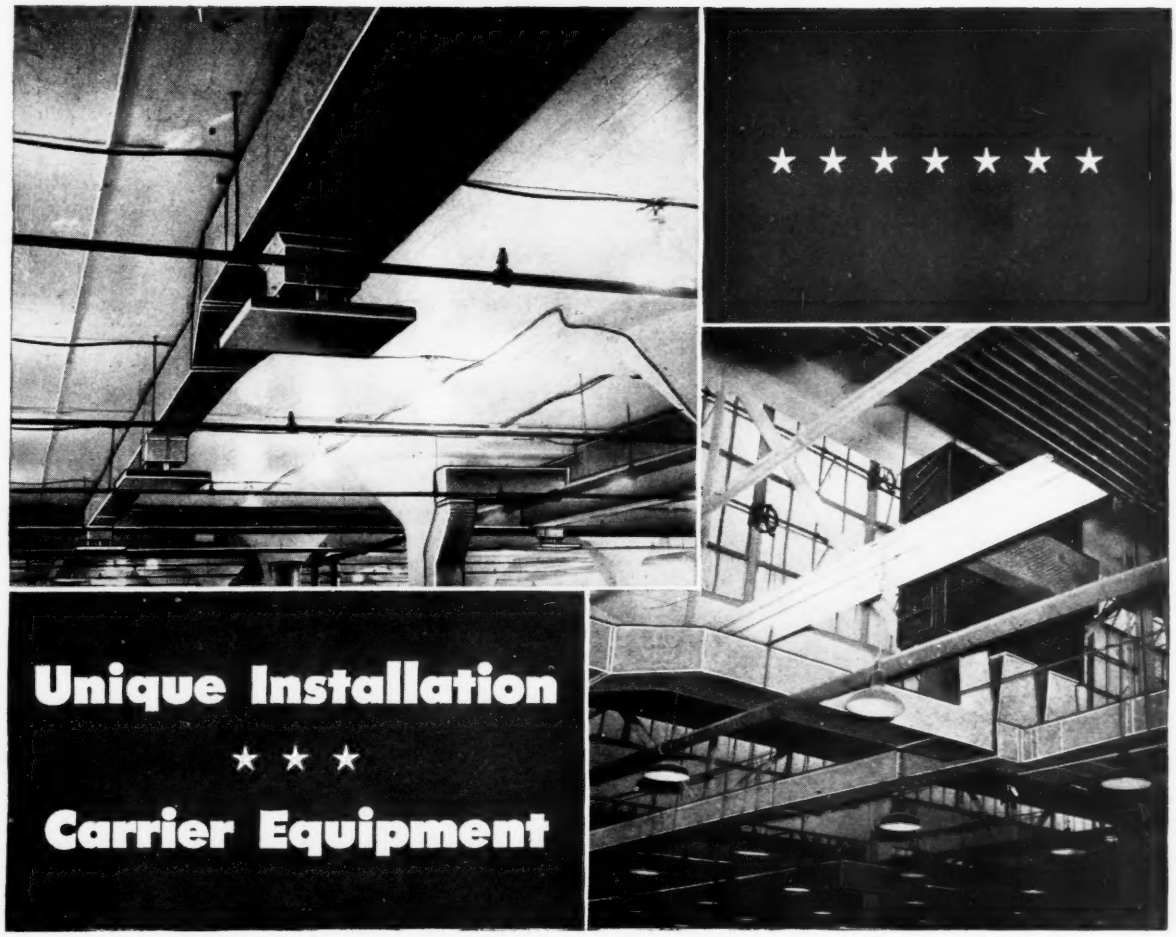

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VOLUME 109 NUMBER 3

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RUBBER WORLD
NATURAL & SYNTHETIC

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Volume 109 **New York, December, 1943** **Number 3**

Rubber Resins

Some Properties and Possibilities of Use

Charles F. Mason[1]

DURING war conditions, when rubber is a familiar topic upon the air, in the newspapers, and at informal gatherings, it is likely that people, whose interests are farthest removed from it, may bring back to mind vague memories of stories about the natives in tropical countries gathering a white fluid from wounds in the trees and coagulating it into a ball of rubber over a fire of nut shells. But this is usually the point where the interest of the general public terminates, and few are familiar with the enormous plantations in the Far East, which have been expanding since the turn of the century; one of their many objects is to have a more uniform source of rubber and with it to give in turn to the public more uniform and improved finished products.

Little need be said here about the economic and industrial benefits of plantation rubber except that the writer does not wish to imply that the gathering of wild rubber had come to a standstill before war conditions were forced upon us. Many forms of it were still coming into the channels of trade for use in chewing gum, electrical insulation, special cements, and other items of less importance. War conditions have not only stimulated the production of rubber from the wild trees, shrubs, and plants, but many workers have been brave enough to attempt transplanting experiments and even investigations of the rubber content in herbs and plants, which have for years been considered of little importance.

Plantation rubber and a few forms of wild rubber contain a minimum of resin content, and no attempt is made for removal upon an industrial scale. It varies from 2.3% of the solid contents, and there is experimental evidence that its presence protects the raw rubber from the effects of air and light during the interval before it is made into useful objects. Some forms of wild rubber, however, contain as high as 80% of resin, and the demand for the rubber hydrocarbon is such that these rubbers are deresinated, and the resin is sold as a by-product.

Two examples of group are gutta percha and balata, the hydrocarbons of which are desired for their thermoplastic properties; in other words they soften upon heating and harden again upon cooling with slightly altered properties and can be made to fit diverse forms. Today while the synthetic rubber development is being pushed ahead rapidly, much effort is being made not only to stimulate increased production of wild rubber, but also to test all the likely looking plants, shrubs and trees which have ever been known to have any rubber content, and there are about 260 known varieties of such forms of vegetation.

It is likely that rubber resins may now be accumulating as a result of the above program, and to meet the needs of one who is considering the adoption of such resins for use in his products or to aid a producer or distributer in finding fields of use, the writer has gathered available information into one manuscript and hopes that it will meet a need because similar information is scattered widely through the most modern texts and journal articles.

Records show that up to 1918 only guayule and Jelutong (Dead Borneo and Pontianak) were subjected to extraction upon a commercial scale, and when this was discontinued upon resumption of normal imports from the plantations deresinized gutta percha and balata were slowly making progress. During and following the late World War it was rumored about that Pontianak resin was so plentiful that it was used as a binding agent in such inexpensive items as flexible asphalt joints, putties, and pipe joining compounds.

History of Rubber Resins

The percentage content of resins in various grades of rubber and the properties of each were for a long time the subject of research by rubber scientists; in fact it was of interest in the middle of the last century and was progressing at the maximum rate around the turn of this century; one object was to establish standards, if possible, for the identification of wild rubber at the ports of entry. Although interest may have slackened in the past decade, much information is now available from which the use or field of use can be predicted. Some experimenters have even attempted to investigate the condition of the resin in the rubber, for example, whether it is present in an adsorbed form or intra-molecularly placed; and although this question is still one of controversy, new and improved methods of extraction have been contributed to rubber technology. Measurements of optical activity, acid number, saponification number, and degree of unsaturation have shown that these resins are complicated in chemical structure; methods of separating them into various fractions by varying the solvent and the temperature of extraction have led to the conclusion that even

[1] Director, Stamford Laboratories, Long Island City, N. Y.

though there are variables in the method of drying and extracting, a rubber resin is defined as the acetone soluble portion extracted under prescribed conditions.

Resin Content of Various Rubber Varieties

The fact is well established that the resin content of different forms of rubber varies with the method of coagulation, the type and age of the tree, degree of rainfall and other factors; hence the figures in Table 1 cover the upper and lower limits, when they are available.

TABLE 1

Type of Rubber	Resin Content %
Plantation pale crepe	1.80— 3.00
Plantation sheets	2.50— 3.00
Plantation smoked crepe	2.50— 3.50
Evaporated latex	5.00— 6.00
Hard fine Para	3.00— 3.50
Ceara scraps	3.00— 5.00
Cameroon balls	7.00—10.00
Lagos lumps	10.00
Guayule	13.00—18.00
Jelutong	70.00—80.00
Oxidized rubber	60.50
Castilloa	18.90
Balata	37.18—48.97
Gutta percha	37.67

The high value of evaporated latex compared to the three plantation varieties just above it in the table adds more evidence to the generalized assumption that in coagulating, a fraction of the resin is coagulated and removed with the rubber; the balance passes into the filtrate or serum. The value of 60.50% for oxidized rubber is a variable and will depend upon the age and conditions. The value of 7.00-10.00 for Cameroon balls is higher than that of evaporated latex, but can be classed with it in respect to the method of removal from the latex and further illustrates the variation with the source of the latex and the care given to it in preventing the entrance of foreign materials. The value of 13.00-18.00 for guayule and the desirable properties of the rubber hydrocarbon, which is present with the resin, might place it in a class to which extraction methods would be commercially profitable.

Table 1 is extended into Table 2 to more properties of these resins, and there are some blank spaces after balata, gutta percha, and jelutong resins because they vary with the source and will be presented more fully in later paragraphs. The physical form of these resins varies, and all that have come to the writer's attention have been plastics with varying degrees of softness except one, which had apparently been processed into an ester or had been compounded with common rosin. It was yellow, opaque, completely extracted with acetone, did not saponify, and the acid number was 121. An unscrupulous dealer was offering it to the public as a wax.

TABLE 2

Type of Rubber	Some Properties of Non-Saponifiable %	Rubber Resins, Melting Point °C.	Acid Number	Nature Physical Form
Plantation pale crepe	15.00		135–186	
Plantation sheets				
Plantation smoked sheet				
Evaporated latex				
Hard fine Para	25.40			
Ceara scraps			172	
Cameroon balls				
Lagos lumps				
Guayule	78.20		240	Paste
Jelutong	83.20	82.00		
Hevea sheet	48.80			
Dyera crepe	77.80			
Oxidized rubber	2.40			
Castilloa	73.70			
Balata				Paste
Gutta percha				
Congo	68.80	74.00	43	Paste
Borneo		92.50		

The above is an example of the incompleteness of the data available on rubber resins, but even though the blank spaces above might be filled with information from unpublished data, it would be a hollow victory because we are interested here only in those resins which are extracted and are for sale to the public. They will be described more fully in later paragraphs. Ball rubber, guayule, Jelutong, balata, and gutta percha may be the only ones available. Guayule resin adds sulphur at the vulcanization temperature and becomes hard, brittle, and opaque. Jelutong does not add sulphur.

Another example of how the Balata resin differs with the source of the material is that of Iquitos, which has a hard brittle resin after extraction and removal of the solvent; while Surinam leaves an oily liquid with the same method of extraction. Gutta percha resin has been coming into commerce in three forms, and the differences can be attributed to the amount of residual solvent in each. They are (1) hard, transparent, and dark red in heavy layers; (2) white and waxy, but changing slowly with age; (3) viscous oils. There are some reports that it is now being rolled out into sheets and sold as a special plasticizer.

In view of the fact that oxidized Jelutong (Pontianak) has been readily available for sale to the public, some properties of three samples are listed in Table 3.

TABLE 3

Sample Number	Acid Number	Saponification Number	Iodine Number	Acetone Soluble %	Melting Point °C
1	3.50	70.00	43.20	99.50	74.00
2	4.10	48.10	44.00	99.30	82.00
3		28.10			92.50

Judging by the percentage content of the portion soluble in acetone, it is apparent that the rubber hydrocarbon is almost completely converted to resin; a condition which occurs with other forms and types rubber. The gradual rise in melting point suggests that Sample No. 3 still contains some unoxidized rubber hydrocarbon.

Jelutong usually comes into the market in the form of cakes, which have about 70% moisture and preservatives to prevent the growth of molds, and only in this form will certain manufacturers purchase it; but the dry oxidized form has been for sale to gum and rosin users under various misleading names like Elastica, etc. It has not been possible to determine the history of drying and oxidation.

Owing to the fact that the resin of Jelutong or the oxidized form described earlier is not attacked by alkalies, its use was suggested for coatings upon lime rich cements and concrete, also to substitute for a portion of the rosin (colophony) in paper sizes. These alkali-resistant coatings may have been replaced with synthetic resins of the cumar type, but the commercial possibilities of them led C. Ellis[2] to investigate their behavior upon heating in open kettles and kettles equipped with air or water coolers for return of the distillates or portions of them to the kettle. He also investigated the behavior in commercial paint vehicles. His data are presented in Table 4.

TABLE 4

Sample Number	Heating Hours	Temp. °C.	Loss %	Fusion Point °C.	Physical Condition
1			0.00	126	White powder
2	12	204	3.10	77	Hard and clear
3	10	232	5.90	78	Hard and clear
4	9	264	13.10	78	Hard and clear
5	1	316		77	Hard and clear
6	3.5	343	50.00		Hard and clear
7	5	343	10.00	65	Hard and clear
8	4	343	16.00		Plastic
9	6	343	18.00		Plastic (flowed)
10		Destructive Distillation			Oil

These tests were made with Jelutong from Sarawak, Dutch Borneo, Sumatra, and the Malayan peninsula. At the port of entry the cakes had the following approximate composition: 10 rubber hydrocarbon, 20 resin, and 70 water. Included in the solid contents are proteins and

[2] *Ind. Eng. Chem.*, 7, 747 (1915).

other naturally occurring plant compounds, which are not recorded and are altered or destroyed in heating.

The iodine number of the crude white powder before heating was 36, that of Sample No. 9 was 62, and that of the oil in Sample No. 10 was 93. This is indicative of very complicated changes which cannot be explained with meager data.

Sample No. 1 was the acetone extracted resin of commerce, which is in the form of white powdery, friable lumps; Samples No. 2, 3, 4, 5, and 6 were heated in open kettles from which was a free escape of vapors; Sample No. 7 was heated under a water-cooled reflux condenser, and Samples No. 8 and 9 were heated under an air condenser of the reflux type, which allowed the vapors of acetic acid and other highly volatile compounds to escape, but the oils were returned to the melt. Samples No. 1-5, even though they had been heated at different temperatures over different time intervals, showed an approach to a constant fusion point of 77 to 78° C. up to a temperature of heating of 316° C. The sharp drop of fusion point after heating for one hour at 316° C. suggests that longer periods of heating at lower temperatures are uneconomical even though the same fusion point of the resulting melt is reached at 204° C. after heating for 12 hours with a loss of 3.10%.

These melts or fused resins were immersed in commercial solvents, and after standing for extended periods the clear supernatant varnishes were decanted and analyzed. In view of the fact that mixed solvents showed no particular advantage over pure ones the results with them are omitted here, and only those for commercial benzol and light benzine are presented. They appear in Table 5.

TABLE 5

Solvent Used	Resin No. Table 4	Quantities (Grams) of Solvent and Resin Mixed		Grams Solid Resin Dissolved
		Solvent	Resin	
Benzol	1	50	50	19.00
Benzol	2	50	50	29.50
Benzol	5	50	50	28.00
Benzol	2	60	40	20.00
Benzol	3	60	40	19.60
Benzol	4	60	40	19.20
Benzol	4	66	34	13.94
Benzol	4	71	29	11.04
Benzine, light	2	60	40	17.20
Benzine, light	3	60	40	17.60
Benzine, light	2	66	34	13.94
Benzine, light	3	66	34	13.60
Benzine, light	4	66	34	13.60
Benzine, light	5	66	34	13.26
Benzine, light	4	71	29	10.73

The results with turpentine and solvent naphtha, also the physical condition of the film upon glass slides are available, but omitted here. Samples No. 2 and 5, histories of which are in Table 4, show the highest degree of solubility in benzol. Comparison of the figures in the fifth column for those of benzol and light benzine show that benzol is the better solvent and that the resin must have been fused for a time interval to attain the maximum solubility of 29.50 in 100 grams of varnish because Sample No. 1, which had received no heat treatment, but was only melted and then thinned with benzol, showed a solubility figure of 19 compared to 29.50 for one which had undergone a loss of 3.10% during heating at 204° C. 12 hours.

The information available upon the solubility of gutta percha and balata resins in various solvents is somewhat indefinite; and instead of figures for the amount of solid resin found in a definite volume or weight of varnish (clear) after settling, only approximations like slightly soluble and completely soluble are available.

The data of O. Merz[5] are presented in Table 6. Although no solubility figures are available, the approximate behavior at two temperatures and two concentrations in 25 solvents may be of aid in choosing a solvent for this resin in meeting a practical need.

[5] "*Kautschuk Lac und Kautschuk Kitte.*" Union Deutsche Berlagsgesallschaft Zweigniederlassung, Berlin, Germany, 1933, pp. 24-25.

TABLE 6. SOLUBILITY OF GUTTA PERCHA RESIN

Solvent	50 Gutta Percha Resin 50 Solvent		25 Gutta Percha Resin 75 Solvent	
	20° C.	100° C.	20° C.	100° C.
Benzol	t. l.	l.	l.	
Toluol	t. l.	l.	l.	
Xylol	t. l.	l.	l.	
Petrol-ether	f. u.	f. u.	f. u.	f. u.
Tetralin	t. l.	l.	t. l.	l.
Methanol	w. l.	w. l.	w. l.	w. l.
Ethanol	t. l.	l.	t. l.	l.
Butanol	t. l.	l.	t. l.	l.
Amyl alcohol	t. l.	l.	t. l.	l.
Hexalin	w. l.	l.	w. l.	l.
Methyl hexalin	w. l.	l.	w. l.	l.
Ether	l.			
Acetone	l.			
Me.-et.-ketone	l.			
Di-acetone-alcohol	t. l.	l.	t. l.	l.
Ethyl-glycol	t. l.	l.	l.	
Me.-acetate	l.			
Et.-acetate	l.			
Bu.-acetate	t. l.	l.	t. l.	l.
Am.-acetate	t. l.	l.	l.	
Hexalin-ac.	t. l.	l. x.	f. u.	l. x.
Tri-cresyl-phos	f. u.	l. x.	f. u.	l. x.
Castor oil	f. u.	x at 150° C.		x at 150° C.

t. l. partly soluble. *f. u.* almost insoluble
l. easily soluble *x.* solidified upon cooling.
w. l. slightly soluble.

In benzol, toluol, and xylol the gutta percha resin is soluble at room temperature up to and around 25% resin, but at 50% resin and the same temperature the solution is saturated, and undissolved resin settles to the bottom. In like manner the balance of the table can be interpreted.

The information upon the solubility of balata resin is of the same approximate nature as that of gutta percha and is in Table 7.

TABLE 7. SOLUBILITY OF BALATA RESIN

Solvent	50 Balata Resin 50 Solvent		25 Balata Resin 75 Solvent	
	20° C.	100° C.	20° C.	100° C.
Benzol	t. l.	l.	l.	
Toluol	t. l.	l.	l.	
Xylol				
Petrol-ether	t. l.	t. l.	l.	
Tetralin	t. l.	l.	l.	
Methanol	f. u.	t. l.	f. u.	t. l.
Ethanol	f. u.	t. l.	f. u.	t. l.
Butanol	f. u.	t. l.	f. u.	t. l.
Amyl-alc.	f. u.	t. l.	f. u.	t. l.
Hexalin	f. u.	l.	f. u.	l.
Me-hexalin	f. u.	l.	f. u.	l.
Ether	l.			
Acetone	f. u.	f. u.	f. u.	f. u.
Me.-et.-ketone	t. l.	t. l.	t. l.	t. l.
Di-Acetone alcohol	f. u.	f. u.	f. u.	f. u.
Ethyl-glycol	f. u.	t. l.	f. u.	t. l.
Me.-acetate	t. l.	t. l.	t. l.	t. l.
Et.-acetate	t. l.	t. l.	t. l.	t. l.
Bu-ac. 98-100%	t. l.	t. l.	t. l.	t. l.
Amyl.-acetate	t. l.	t. l.	t. l.	t. l.
Hexalin-ac.	t. l.	l.	l.	

l. easily soluble. *f. u.* insoluble
t. l. partially soluble. *x.* solidified upon cooling.
w. l. slightly soluble.

With benzol, toluol and xylol this resin behaves somewhat similarly to gutta percha resin. Beyond this statement the table only points the way to one who wishes to use one of these resins and is restricted by the solvent and conditions to be met, beyond that one must experiment.

The methods of extracting rubber resins upon a commercial scale with volatile solvents have been described in texts and former journal articles. What is more, they have been the subject of certain patents; hence they need not be described again here.

Summary and Conclusions

However their uses and possibilities of future use deserve consideration. Their tendency to thicken in certain solvents has been applied to use in imparting false body (thickening) to certain varnishes. In such cases it is likely that the rubber resin is modified to reduce tackiness before compounding it into quick-drying spirit varnishes.

(*Continued on page 306*)

The Effects of Blending Guayule Rubber with GR-S[1]—II

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THE tests listed below were performed on the vulcanized stocks. As pointed out above,[2] some of the 100% guayule stocks and some of the blends were not submitted to processing tests in the uncured state or to physical tests in the cured state, because they were impracticably soft and tacky. Moreover some of the stocks which were satisfactory from the processing standpoint were not submitted to all of the physical tests because their tensile strengths were extremely low.

Tests Performed

TABULATION OF TESTS PERFORMED

Tensile Properties—Initial tensile strength, ultimate elongation, moduli at 100% and 300% elongations, and permanent set at 300% elongation.
Oxygen Bomb Aging—Change in tensile strength.
Air Oven Aging—Change in tensile strength, ultimate elongation and modulus at 100% elongation.
Tear Resistance.
Hardness—Shore.
Compression Set.
Rebound.
Compression Fatigue—Temperature rise, initial dynamic compression, and final dynamic compression.
Brittleness—Nick growth by flexing.

The details of the procedures employed for conducting these tests are given in the following paragraphs.

TENSILE PROPERTIES. Tests for tensile strength, ultimate elongation, moduli at intermediate elongations, and permanent set at 300% elongation were performed in accordance with the method recommended by the A.S.T.M.[3]

OXYGEN BOMB AGING. The tests for oxygen bomb aging were performed in accordance with the method recommended by the A.S.T.M.[4] The conditions were oxygen pressure: 300 p.s.i.; time: 10 days; temperature: 158° F.

AIR OVEN AGING. The tests for air oven aging were performed in accordance with the method recommended by the A.S.T.M.[5] The conditions were time: seven days, temperature: 194° F.

TEAR RESISTANCE. It has been found in this laboratory[6] that the tear resistances of GR-S vulcanizates are much more seriously affected by the application of gasoline or other petroleum products to the cut surface immediately before tearing than are the tear resistances of other synthetic vulcanizates or *Hevea* vulcanizates. Accordingly tear tests with and without the application of gasoline were conducted on vulcanizates in this investigation to determine whether blending with guayule rubber improved the tear resistances of the GR-S stocks in the presence of gasoline.

The dry tear test was conducted by the method recommended by the A.S.T.M.[7] using Type A crescent-shaped specimens. The wet tear test was made by the same procedure except a brush wet with gasoline was held gently against the cut while the specimen was being stretched, as shown in Figure 1. The results of both tear tests are expressed in terms of pounds per 0.1-inch thickness instead of in terms of pounds per one inch thickness as specified by the A.S.T.M. The authors feel that projection of data obtained on slabs about 0.08-inch thick to a one inch thickness is not justifiable and may be misleading since tear resistance does not vary in direct proportion to thickness.

SHORE HARDNESS. The Shore hardness of the vulcanizates was found by the procedure recommended by the A.S.T.M.[8] The specimens were ½-inch thick, and the readings were taken after 10 seconds. The specimens for this test were vulcanized five minutes longer than the corresponding sheet cures.

COMPRESSION SET. Compression set under a constant deflection of 25% was determined according to the procedure recommended by the A.S.T.M.[9] The specimens for this test were vulcanized five minutes longer than the corresponding sheet cures.

REBOUND. Rebound was determined with the Goodyear-Healy pendulum machine using an angle of fall of 15 degrees. The specimens for this test were one inch by one inch by two inches and were vulcanized 15 minutes longer than the corresponding sheet cures.

COMPRESSION FATIGUE. The criteria of compression fatigue were the temperature rise and the change in dynamic compression, or plastic flow, of cylindrical specimens after 30 minutes' cyclic compression at 1800 cycles per minute in the Goodrich flexometer. A description of this machine and the details of the testing procedure were given by Lessig.[10] The cylindrical specimens were one inch high and 0.7-inch in diameter. They were cut from blocks one inch by 2¼ inches by 2¾ inches, which were vulcanized 20 minutes longer than the corresponding sheet cures. The load on the specimen and the extent of the compressive stroke depended somewhat upon the compression characteristics of the stock. However all of the stocks containing the same pigment were tested under the same load and with the same compressive stroke. These details are tabulated below.

Pigment Loading	Compressive Stroke—Inch	Load—P.S.I.
None	0.175	118
Semi-reenforcing black	0.175	118
Fine thermal black	0.175	118
Zinc oxide	0.175	118
Ultra-fine whiting	0.175	118
Hard clay	0.175	70.8
Channel black	0.125	118

BRITTLENESS. The brittleness of the stocks was determined by a variation of the procedure described by Vila.[11] A nick about two millimeters long was made with a razor blade at the bottom center of the circular groove in De Mattia band flexing specimens.[12] The width of the nick,

[1] The opinions or assertions in this paper are those of the authors and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.
[2] INDIA RUBBER WORLD, Nov., 1943, pp. 150-52, 192.
[3] A.S.T.M. Standard, Designation D412-41.
[4] A.S.T.M. Standard, Designation D572-42.
[5] A.S.T.M. Standard, Designation D573-42.
[6] Morris, Mitton, Montermoso, and Werkenthin, *Ind. Eng. Chem.*, 35, 646 (1943).
[7] A.S.T.M. Standard, Designation D624-41T.
[8] A.S.T.M. Standard, Designation D676-42T.
[9] A.S.T.M. Standard, Designation D395-40T.
[10] *Ind. Eng. Chem., Anal. Ed.*, 9, 582 (1937).
[11] Vila, *Ind. Eng. Chem.*, 34, 1269 (1942).
[12] A.S.T.M. Standard, Designation D430-40.

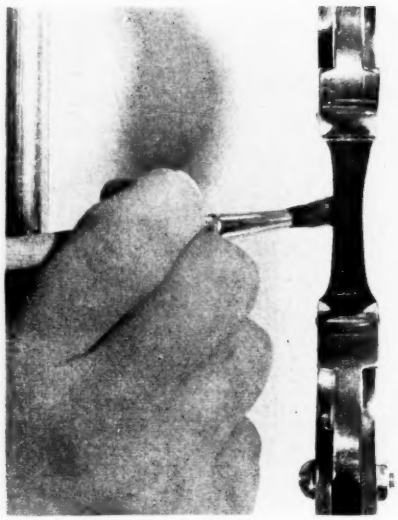


Fig. 1. Method of Applying Gasoline during the Wet Tear Test

made parallel to the groove, was determined accurately with a measuring microscope. The specimens were then flexed in the De Mattia machine at the rate of 300 cycles a minute. During each stroke of the machine the grips approached each other to a distance of 1¾ inches and separated to a distance of three inches. This operation caused the specimens to straighten and to bend to an angle of approximately 45 degrees alternately. The flexing was done in air at 82° F.

After a definite number of flexes the width of the nicks was redetermined with the measuring microscope. The increase in width of the nicks was regarded as a measure of the brittleness of the stocks. A photograph showing the appearance of specimens before and after flexing is given in Figure 2.

It was not feasible to flex all of the stocks through the same number of cycles because of the considerable difference in brittleness of the stocks. Nevertheless the stocks with the same pigment loading were flexed through the same number of cycles. The number of cycles used for each series was adjusted so that the most brittle stock in the series did not crack the full width of the specimen. The number of cycles used for each loading follows:

Pigment Loading	Flexing Cycles
None	200,000
Channel black	8,000
Semi-reenforcing black	8,000
Fine thermal black	48,000
Zinc oxide	4,000
Hard clay	48,000
Ultra-fine whiting	16,000

Insulation Resistance

Sheets of the stocks were washed with acetone and conditioned for at least 24 hours at 82° F. and 40-45% humidity. Then they were tested for electrical conductivity using a direct-current Wheatstone bridge in conjunction with a vacuum-tube voltmeter. To keep the resistance readings within the range of this instrument the thickness of the sheets was either 0.02-inch or 0.08-inch. The thickness selected for a particular test depended upon the intrinsic resistance of the stock being tested.

The upper electrode pressure was 0.59-pound per square inch. A large flat plate was used as a bottom electrode for all of the stocks. The surface of both electrodes was wet with a soap solution before placing in contact with the rubber in order to secure complete contact.

Discussion of Results of Tests

The results of all the tests on the vulcanized stocks, except the test for insulation resistance, are given in the form of bar graphs in Figures 3 to 9 inclusive. The results of the insulation resistance tests are tabulated in Table 1. The test results obtained for each pigment loading will be discussed separately; then an attempt will be made to summarize the advantages in physical properties which accrue through the use of blends.

TABLE I. INSULATION RESISTANCE
Megohms-Centimeter

Pigment Loading	Composition of Blends				
	100% GR-S	80% GR-S 20% Guayule	50% GR-S 50% Guayule	20% GR-S 80% Guayule	100% Guayule
None	—	—	310×10^3	180×10^3	—
Channel black	140	92	35	24	61
Semi-reenforcing black	140×10^3	9.8×10^3	—	—	
Fine thermal black	450×10^3	34×10^3	4.1×10^3	2.7×10^3	
Zinc oxide	730×10^3	430×10^3	290×10^3	—	
Hard clay	4000×10^3	4000×10^3	4000×10^3	1900×10^3	
Ultra-fine whiting	300×10^3	240×10^3	170×10^3	—	

NO LOADINGS. The properties of the stocks containing no loading are charted in Figure 3. The very poor tensile strengths of the 100% GR-S and 80% GR-S-20% guayule stocks and the much higher tensile strength of the 50% GR-S-50% guayule stock are noteworthy. The oxygen bomb aging, permanent set, tear resistance, and compression set of the guayule stock were improved by substitution with 20 parts GR-S. The 100% GR-S, 80% GR-S-20% guayule, and 100% guayule stocks were not subjected to all the tests because the first two stocks were impractical from the standpoint of tensile properties, and the third stock was impractical from the standpoint of processing.

CHANNEL BLACK LOADING. The properties of the stocks containing channel black loading are charted in Figure 4. Substitution with 20% guayule rubber in the GR-S stock did not lead to any serious loss in quality and brought about considerable improvement in resistance to nick growth. Substitution with 50% guayule rubber resulted in much poorer oxygen bomb aging and consider-

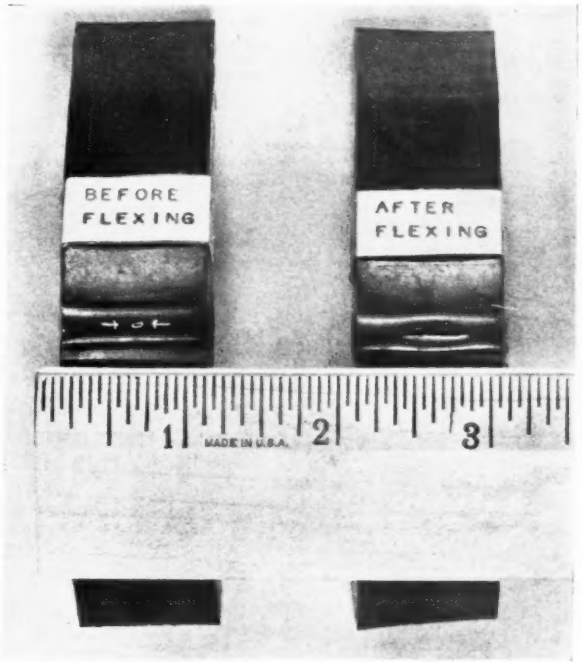
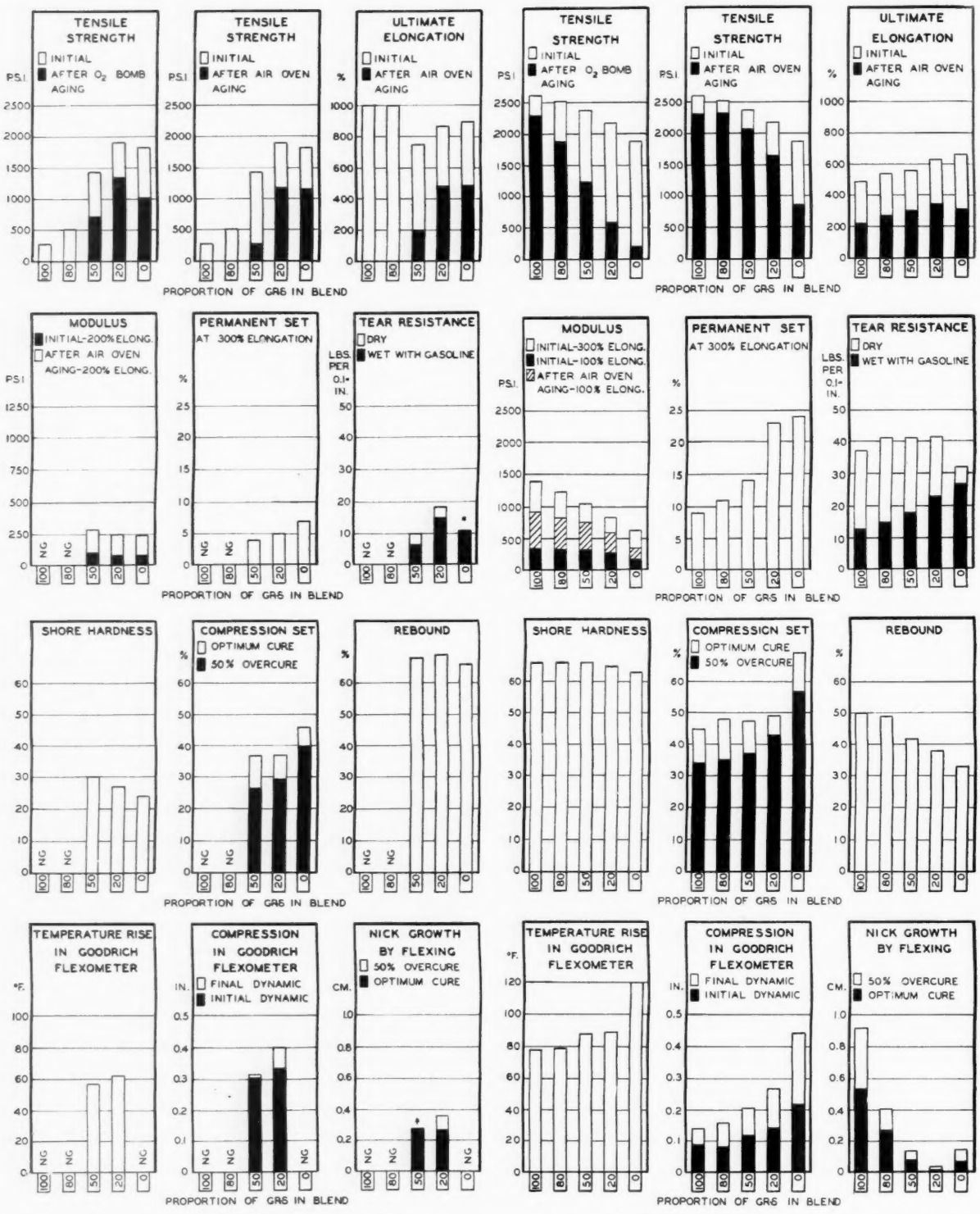


Fig. 2. Specimens Used in the Brittleness Test



NG—Not Tested

*—Values Are the Same

‡—Value for 50% Overcure Is 0.56

Fig. 3. Properties of Stocks with No Loading

Fig. 4. Properties of Stocks Loaded with MPC Black

able loss in permanent set and rebound, although the resistance to nick growth was further improved.

Most of the properties of the guayule stock were improved by substitution with GR-S. The major improvements were in the following properties: tensile strength, tear resistance, compression set, rebound, temperature rise in the flexometer, and plastic flow in the flexometer.

Semi-Reenforcing Black Loading. The properties of the stocks containing semi-reenforcing black are charted in Figure 5. The properties of the GR-S stock, except for resistance to nick growth and insulation resistance, re-

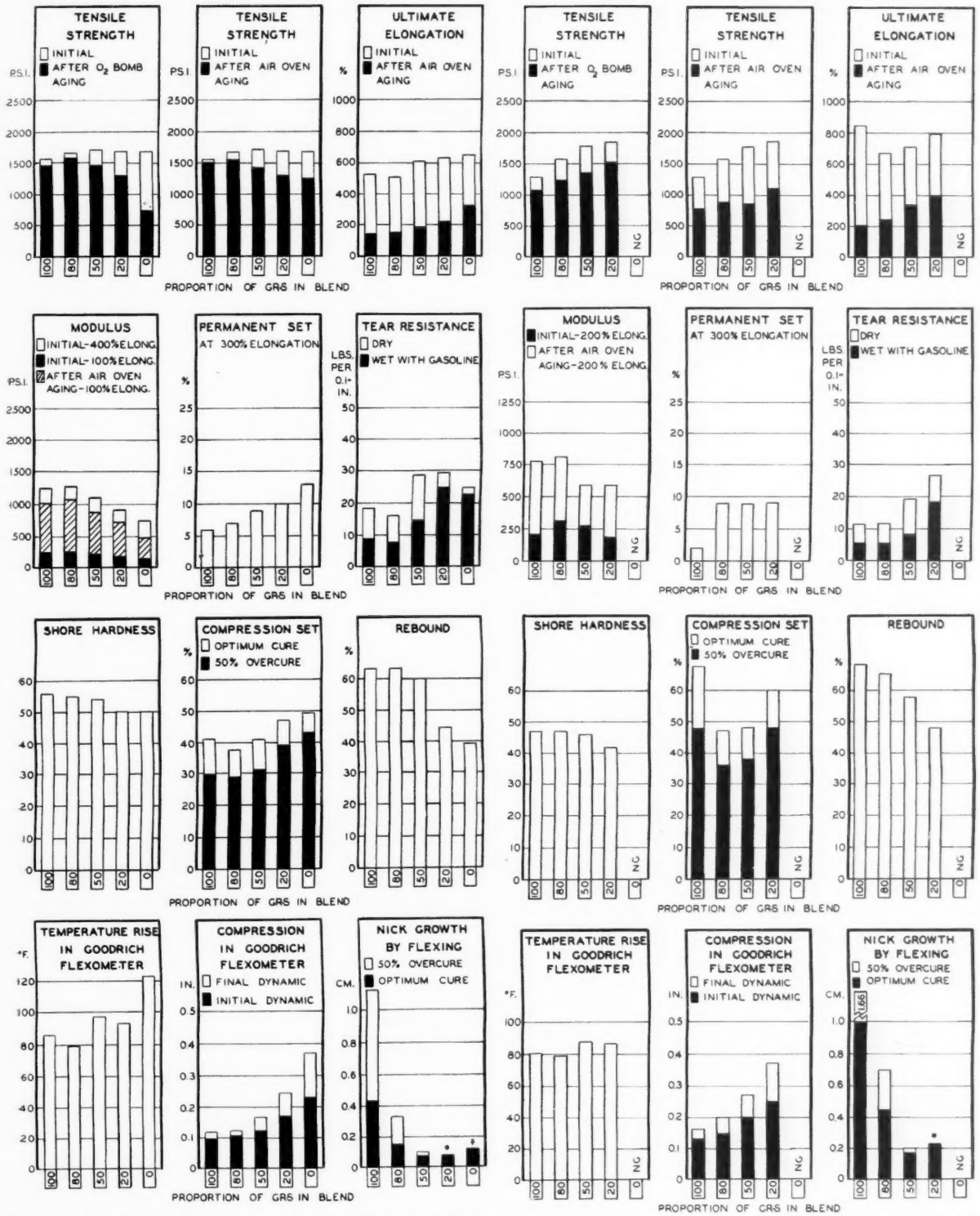


Fig. 5. Properties of Stocks with SRF Black Loading

Fig. 6. Properties of Stocks Loaded with FT Black

mained almost unchanged when a 20% substitution was made with guayule rubber. A 50% substitution improved the tear resistance, but increased permanent set and temperature rise in the flexometer. In contrast to the comparable stock containing channel black, the 50% GR-S-50% guayule stock aged almost as well as the 100% GR-S stock.

The inclusion of 20% GR-S in the guayule stock bettered all of the properties. The greatest improvement was in oxygen bomb aging, permanent set, rebound, tempera-

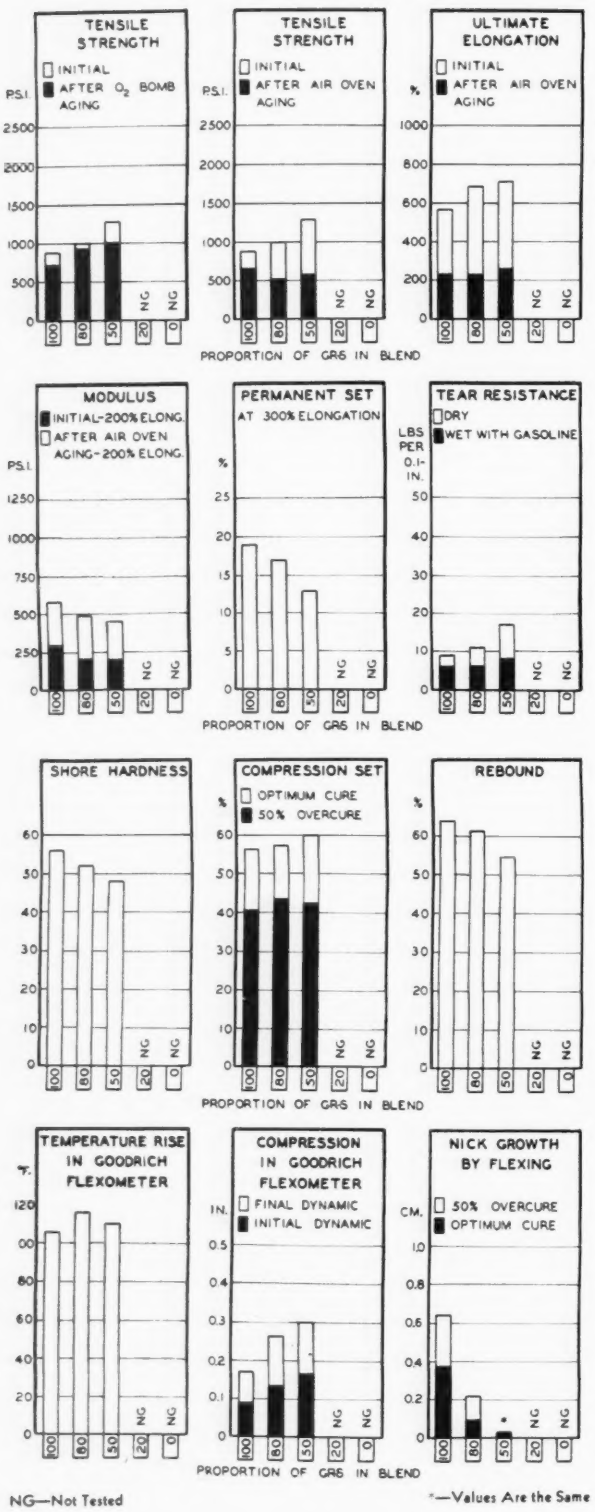


Fig. 7. Properties of Stocks Loaded with Zinc Oxide

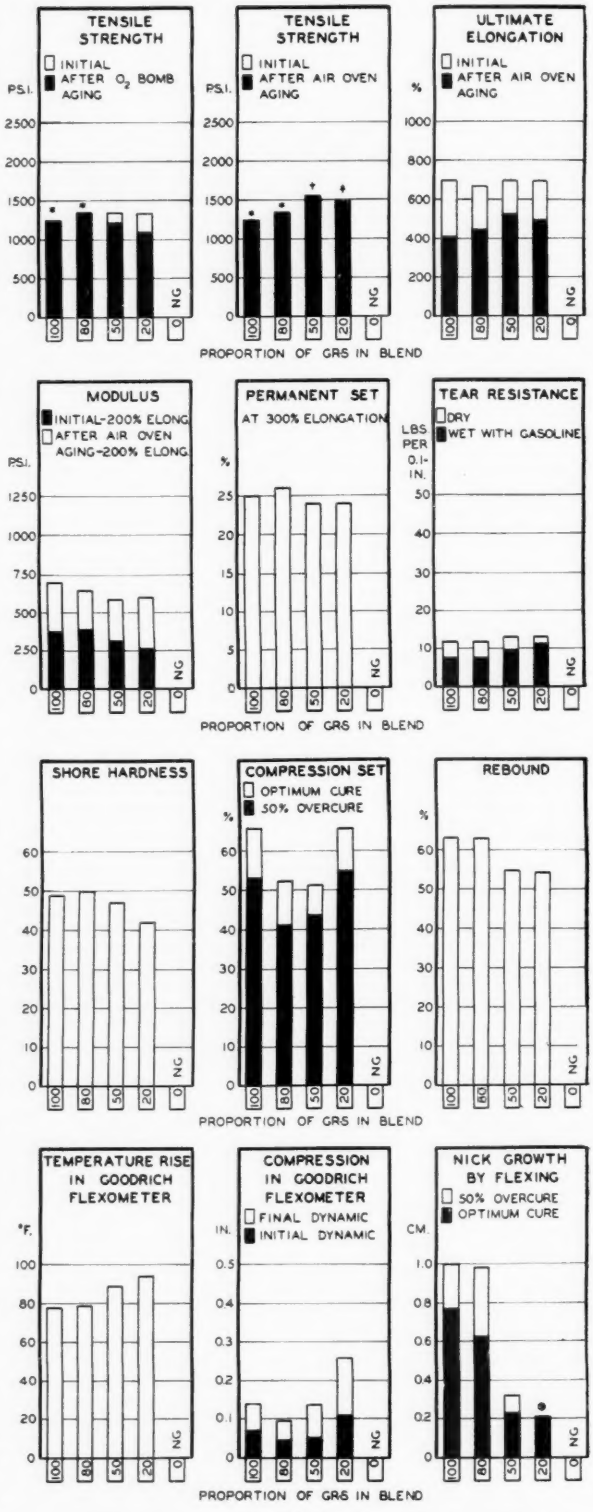
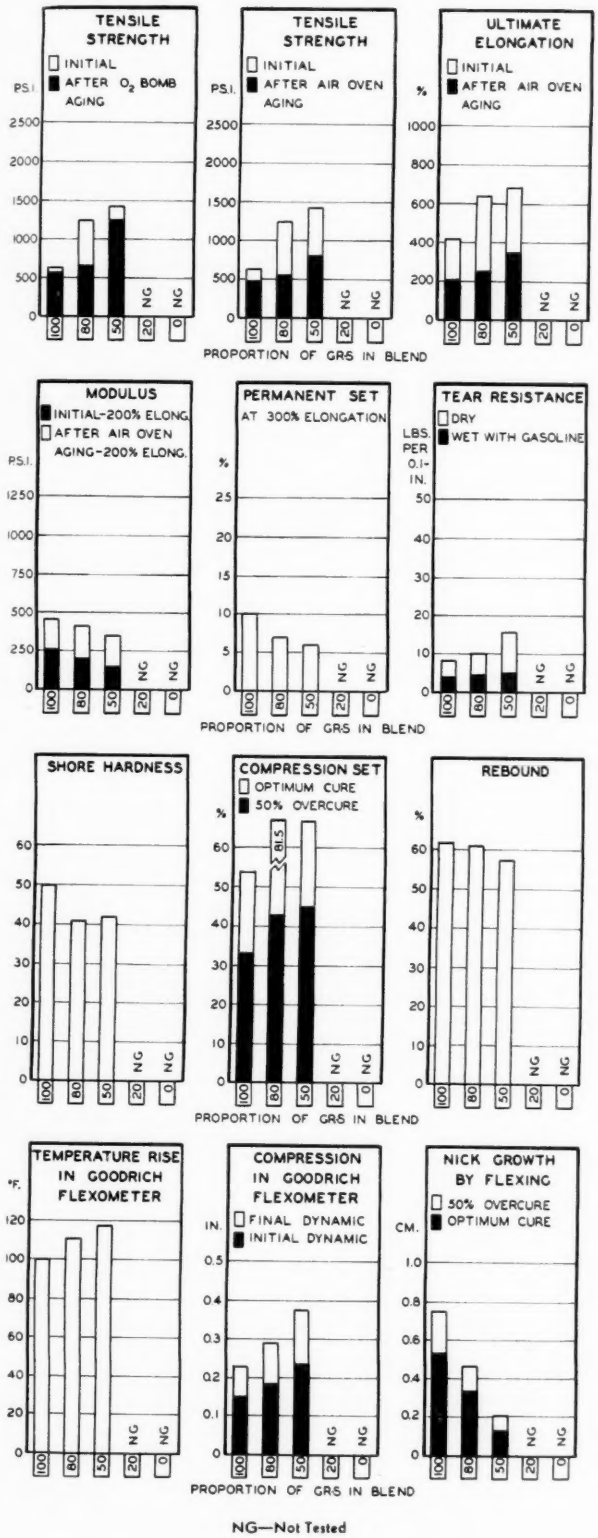


Fig. 8. Properties of Stocks Loaded with Hard Clay

ture rise in the flexometer, and plastic flow in the flexometer.

Fine Thermal Black Loading. The properties of the stocks containing fine thermal black are charted in Figure 6. No data are plotted for the 100% guayule stock because this stock did not process satisfactorily. The substitution of 20% GR-S by guayule rubber slightly improved tensile strength and considerably improved compression set and resistance to nick growth, but this



NG—Not Tested

Fig. 9. Properties of Stocks Loaded with Ultra-Fine Whiting

substitution was quite detrimental to ultimate elongation and permanent set.

The 20% GR-S-80% guayule stock had good tensile properties, good tear resistance, and good resistance to nick growth, but it had high compression set, low rebound, and considerable plastic flow in the flexometer.

It is interesting to note in Table 6[13] that blending with guayule rubber impaired the electrical resistance of the GR-S stock. This was true for all of the loadings.

Zinc Oxide. The properties of the stocks containing zinc oxide are charted in Figure 7. No tests were performed on the 20% GR-S-80% guayule stock or the 100% guayule stock because these stocks were difficult to process. The substitution of guayule rubber for part of the GR-S enhanced the tensile properties, diminished the permanent set, improved the tear resistance, and decreased the nick growth with flexing. This substitution had an adverse effect on rebound and plastic flow in the flexometer.

Hard Clay. The properties of the stocks containing hard clay are charted in Figure 8. The 100% guayule stock was not tested because it was too difficult to process. The main advantage gained by substituting guayule rubber for 20% of the GR-S was reduced compression set; there was no important disadvantage. A 50% substitution improved the tensile properties after aging and increased the resistance to nick growth, but it also decreased rebound and produced a greater temperature rise in the flexometer.

Ultra-Fine Whiting. The properties of the stocks containing ultra-fine whiting are charted in Figure 9. The 20% GR-S-80% guayule and 100% guayule stocks were not tested because of processing difficulties. Substituting guayule rubber for GR-S improved all properties except compression set, rebound, temperature rise in the flexometer, plastic flow in the flexometer, and insulation resistance.

Summary of Effects on Cured Properties

A 20% substitution of guayule for GR-S in the GR-S formulations had no serious effect on the properties of any of the vulcanizates. It improved markedly the resistance of the stocks to nick growth by flexing.

A 50% substitution of guayule for GR-S generally led to quite detrimental changes in permanent set, rebound, temperature rise in the flexometer, and plastic flow in the flexometer. This substitution would not be justified in practice, except possibly in the case of pure gum stocks.

A 20% substitution of GR-S for guayule rubber in the guayule formulations containing channel black and semi-reenforcing black, respectively, was found to have a beneficial effect on almost all properties. The improvements were particularly in aging, tear resistance, compression set, temperature rise in the flexometer, and plastic flow in the flexometer.

A 50% substitution of GR-S for guayule rubber was directionally advantageous in most cases when considered in contrast with the 20% substitution or the 100% guayule stocks.

Summary and Conclusions

A 20% substitution with guayule rubber in the GR-S formulations improved the processing and handling characteristics of the GR-S stocks and did not detract from their vulcanized properties to any appreciable extent in most cases. In fact their resistance to nick growth was markedly enhanced by adding guayule rubber. A 50% substitution was outstanding for best handling and processing characteristics, but this amount of guayule rubber impaired most of the vulcanized properties.

A 20% substitution with GR-S in the guayule formulations improved the processing and handling characteristics of the raw guayule stocks. Also it improved many of their vulcanized properties, although the vulcanized

(Continued on page 294)

[13] India Rubber World, Nov., 1943, p. 192.

Progress Report No. 4 of Rubber Director

THE supply of tires and other essential rubber goods continues short and will be so for a long time, but given adequate feed stocks, fuel and other essential materials and labor, no one need worry about this country's ability to produce synthetic rubber. The task of constructing the vast new synthetic rubber industry is nearing completion; the more important processes have been proven; the characteristics of the synthetics are constantly being evaluated for a vast number of products; and daily the rubber manufacturing industry is improving its techniques for using the new forms of rubber. Synthetic rubbers in large quantity are being produced and used, and by the early part of 1944 all of the plants in the production program will have been completed and will be in production. The critical question of 1942: "Can enough rubber be produced before exhaustion of the crude rubber stockpile?" has been answered in the affirmative.

The Basic Situation

Availability of synthetic rubber, however, does not immediately assure an adequate number of tires or other rubber products. As is well known, the synthetic rubber construction program is being completed far later than we wished, and as a result, many of the corollary programs necessarily had to wait until experience with the use of synthetic rubber could be gained. But now the job of translating raw materials into a sufficiency of suitable military and consumer rubber products is under way. The solution is dependent upon management, labor, scientists, and engineers, in and out of the rubber industry. It demands the utmost of self sacrificing cooperation by all.

The rubber program in the past year presented four major programs: (1) the increase of reclaim rubber production and of retreading materials and facilities; (2) the construction and development of plants to produce synthetic rubbers and their principal raw materials, butadiene and styrene; (3) the expansion of the rubber manufacturing industry to process synthetic rubber into usable products; and (4) the expansion and conversion of allied industries to produce the necessary components of rubber goods, such as high-tenacity rayon tire cords, carbon blacks, etc.—materials essential to the making of rubber goods. The first two programs are effectively behind us, while the other two are under way. Upon the speed of completion of the latter two, together with effective management and a sound manpower and labor situation, depends the time when this country will be able to get enough rubber products to maintain the irreducible needs of modern warfare and essential civilian transportation. In the meantime the allocation of available tire production as between essential military needs on the one hand and essential trucks and buses on the other will be one of our most difficult problems.

Since the last report of progress from this office,[1] we have been confronted with the much larger requirements of the Armed Forces for heavy-duty, combat, and airplane tires as a result of changing war conditions, and the ineffective general manpower situation which has made it difficult to man even existing equipment.

The next six to nine months will be the most difficult. The effect of a global war, the past two years of wear and tear upon existing tires, and the necessity, in order to save crude rubber, of building only military and a few most essential tires have emphasized the scarcity of tires. The inventories of tires built up in times of peace have now been drawn down to an irreducible minimum; the requirements of the military forces are tremendous and have increased materially, and while new production will increase, it will have to wait for the gradual installation and manning of the expansions of other programs. A shortage of rayon tire cord has required, and continues to require, an excessive use of crude rubber. In the meantime, the greatest conservation must be maintained. For a long time to come, recapped tires must continue to carry much of the transportation burden.

Review of Synthetic Rubber Plant Program

As described in previous reports[1] of this Office, the synthetic rubber program of the United States and Canada has a rated capacity of 850,000 long tons per year. Of this total, plants to produce Buna S have a capacity of 735,000 long tons, Butyl plants 75,000 long tons, and neoprene 40,000 long tons. Another 9,000 long tons of neoprene are being produced in a prewar private plant. The geographical distribution of these capacities is shown in Exhibit "A."[2] Exhibit "D" at the end of the report shows the priorities applicable to the various units and the relationship of the present rated capacities to the original recommendations of the Baruch Committee.

As of October 31, 1943, the program has progressed to the point where completed plants have a rated annual capacity of 646,000 long tons of rubber. This progress is best shown in the tabulation below, which includes the status of construction of plants producing butadiene and styrene:

Product	Rated Capacity	Rated Capacity of Construction Completed—10/31/43	% Completed
	Long Tons	*Long Tons*	
Buna S	735,000	585,000	80
Butyl	75,000	21,000	28
Neoprene	40,000	40,000	100
	850,000	646,000	76
Butadiene:	*Short Tons*	*Short Tons*	
From alcohol	230,000	200,000	87
From petroleum	460,400	179,900	39
	690,400	379,900	55
Styrene	202,700	163,700	81

Eighty-seven per cent. of the butadiene-from-alcohol plants have been completed and 39% of those producing butadiene from petroleum. This is due to three principal factors:

1. Ninety-six per cent. of the butadiene-from-alcohol plants received the highest priorities (first directive); while only 40% of the petroleum plants had that priority advantage.

2. The three butadiene-from-alcohol plants at Institute, Louisville, and Pittsburgh (Kobuta) are made up of eleven identical 20,000-ton units which involved only one design problem and simplified building of duplicate units.

3. A major raw material for butadiene from petroleum sources is butylene made in the cracking of oil, largely by the use of the modern catalytic cracking processes now being built for the high-octane gasoline program. The oil industry has undergone a huge expansion program to supply this material as well as other materials for the production of butadiene and high-octane gasoline. Manpower, as well as shortages of critical component parts, has delayed the construction of both butadiene plants, and the raw material feed stock plants.

Since the last report of this office,[1] the only changes in the program have been the cancellation of an 8,000-ton oil refinery conversion butadiene plant and the upward revision by about 10,000 tons per year of the butadiene-from-alcohol plants.

The butadiene-from-alcohol plants have given an excellent account of themselves and for some time have produced at substantially higher than rated capacity. These plants have been the principal source of butadiene for the last few months. This will continue to be the case until early next year.

Disappointments have been encountered in the production of Butyl rubber. Intensive research is being carried on in the hope of finding a satisfactory solution to this problem. Pending results of this research, production is negligible, and the burden must be carried by other rubbers.

All neoprene plants have been completed and are producing at rated capacity. These have been among the most successful parts of the entire rubber program, and great credit is due to the designers and operators of these plants.

As was to be expected, plants have encountered varying degrees of difficulty in starting up. They are part of a new industry which, because of the urgencies of war, had to start from scratch. As a rule, there was no time to test processes in pilot plants prior to construction. There has been no time for the normal steps. The fact that so many problems have been solved in so short a time reflects great tribute to this country's chemical and engineering industry. The resourcefulness of its personnel has produced almost a miracle.

Plants are running, producing raw materials. Synthetic rubbers in increasing quantities are being delivered to rubber manufacturers in this country and abroad for conversion into rubber products. The principal processes have been proven in commercial production so that today it is possible to say with assurance that the production of synthetic rubbers, with the exception of Butyl, has passed the doubtful stage. Early next year practically all of the construction will have been completed. In the meantime, barring unforeseen developments, existing plants will produce enough synthetic rubbers to keep the rubber manufacturing industry operating at its present limited capacity.

Manufacturing Facilities Program

When this country was cut off from its rubber supplies and severe restrictions were placed upon the rubber manufacturers, the industry turned to the production of many products which it had never before produced. These included not only goods made with rubber, but also non-rubber Ordnance items and other war products, such as ammunition and guns. Its excellent facilities and buildings were converted to such new manufacture. Equipment which was not in early 1942 being used in the manufacture of tires was moved out of existing buildings

[1] INDIA RUBBER WORLD, June, 1943, pp. 262-64.
[2] All illustrations have been omitted in the interests of paper conservation. EDITOR.

and stored. Rubber warehouses were converted into manufacturing units.

With synthetic rubber now available and with military and essential civilian demands increasing, the rubber industry is again called upon to fabricate an enormous number of rubber products, particularly tires of large sizes for combat vehicles, airplanes, trucks, buses, and farm implements.

Prewar facilities and equipment left in place are now entirely insufficient to meet the new demands. In addition, synthetic rubber has, to date, required additional machinery, and longer processing time than did natural crudes. As a result, the industry has embarked upon an expansion in plant capacity and facilities in which it will invest over $70 million of its own capital.

Only two new rubber fabricating plants are now scheduled to be built. The balance of the program calls for expansions of existing plants at established locations and the acquisition and installation of new milling and processing equipment. New war activities, which rubber companies carried on while they were producing lesser quantities of tires, are being moved to other locations more suitable under present conditions. The Army has turned back to the industry two large tire plants which were being used for producing Ordnance items.

This expansion program involves an increase of capacity at Akron, Los Angeles, and other places at which plants now exist. It is wiser to secure these new facilities quickly by expansion of present plants rather than to wait from twelve to eighteen months for the construction of new plants in other locations, which, in addition would require new organizations and the training of new employes.

However, expansion of plant facilities alone will not produce the volume of tires and other products needed to support the war. Greater output per-man-hour on the part of labor, reduction in absenteeism, more efficient flow of materials, better management planning, and improved distribution of manpower are all essential to this program. Labor and management are working together, and it is to be hoped that improved results will come from their cooperative action.

With the engineering of the projects largely finished and the approvals of various parts by the War Production Board secured, the program should move full speed ahead. Even with their high priorities, their completion will require from four to twelve months. Not for a year will the fully expanded output of the industry be realized.

Tire Cord Program

In April of this year, this Office submitted its 1944 requirements for rayon and cotton tire cords. These needs were based on the then-stated requirements for tires on the part of the Armed Forces and for necessary essential civilian transportation. They called for a broad conversion in both the rayon and cotton textile industries. Now, the needs are even greater.

After some unfortunate delays, the program for these facilities has been set by the War Production Board, and we are assured that it will move forward at the fastest rate possible.

Airplane and certain types of heavy-duty military and truck and bus tires cannot be made satisfactorily of synthetic rubber except in conjunction with rayon tire cord. The shortage of rayon tire cord prevents a more complete conversion of synthetics for these tires.

Although the cotton cord situation is very tight, we are assured by the Textiles Division of the War Production Board that it will provide adequate supplies.

1933-1944 Estimated Quarterly Production* of Synthetic Rubber for Buna S, Butyl, Neoprene, and Buna N

	1943				Year	1944				Year
	1st	2nd	3rd	4th	Total	1st	2nd	3rd	4th	Total
Buna S...	3,102	18,792	56,741	105,000	183,635	145,000	185,000	190,000	190,000	710,000
Butyl...	35	393	364	1,500	2,292	4,000	6,000	12,000	17,000	39,000
Neoprene.	4,372	5,853	10,049	12,300	32,574	12,300	12,300	12,300	12,300	49,200
Buna N...	2,977	3,335	4,063	4,500	14,875	5,000	5,000	5,000	5,000	20,000
Total Synthetic	10,486	28,373	71,217	123,300	233,376	166,300	208,300	219,300	224,300	818,200

All quantities are estimated in long tons.

* Includes neoprene and Buna N capacities of private plants.

The Balance Sheet of Rubber

The most important concern of this Office has been and is the conservation of the crude rubber stockpile so that, even when synthetics are plentiful, there will still be left a working stock for use where some crude rubber is necessary in combination with synthetics, for example, in large-size over-the-road truck and bus tires. To that end, conversion of products to synthetics has been put into effect as quickly as research has solved the problems involved and synthetics have become available.

The present crude rubber stockpile, together with new imports from those tropical countries remaining in United Nations' hands, must carry us through. It is a difficult problem. At the start the synthetic rubber program was materially delayed by many differences of opinion and shortages of materials which combined to postpone the availability of synthetics and the opportunity of substituting them for crude. Shortages of rayon tire cord and manufacturing facilities will further reduce the crude position.

In order to tide this country through the period when rayon is unavailable in sufficient quantity to produce the large requirements of the Armed Forces and domestic transportation companies for heavy-duty tires, the greatest care must be taken to prevent any avoidable use of any crude rubber.

Imports of natural crude rubber for 1943 are now expected to total 60,000 long tons. It is expected that imports in 1944 will be augmented by increased shipments from British territory and be about a third greater than in 1943. As a result of the creation by the President of the Office of Foreign Economic Administration, all American development and procurement programs in foreign countries have become its responsibility.

Exhibit "B"[2] shows in long tons the actual production of synthetic rubber in the United States and Canada during the first three quarters of 1943, together with close estimates for the last quarter of 1943 and rough estimates for the year 1944.

Scrap Rubber. The country has a satisfactory supply of scrap rubber on hand. As of September 30, 1943, this amounted to approximately 754,000 tons, including 463,000 tons of pneumatic tires and tire parts. The monthly usage is about 35,000 tons.

The tire collection plan of last year brought in approximately 12,000,000 tires. These tires were stored in guarded reservations, and most of them have been sorted (some several times) to secure every usable tire which could be repaired or recapped and reissued for use by essential drivers. Usable tires are also being recovered at reclaiming plants. The tires which have been found unusable are being held for the manufacture of reclaimed rubber.

Besides tires, a large amount of assorted scrap was collected by the government in the scrap drive of a year ago. Much of this has been and is being used in the manufacture of reclaim rubber. A part of this miscellaneous scrap, however, is of such low quality that it cannot be used and will have to be destroyed by burning or otherwise.

Requirements

The Office of Rubber Director receives from various government agencies their stated requirements for rubber products. The Armed Forces, of course, are the largest users of such products. These requirements are translated by this Office into requirements of rubber and the many components—tire cords, carbon blacks, chemicals, etc.—that go into their production. Requirements for components are then transmitted to the branches of government having jurisdiction. The natural rubbers and synthetic rubbers are our responsibility.

Military Requirements. The vast airplane and other equipment programs of our Armed Forces are naturally dictated by the exigencies of war. Now, increasing quantities of rubber products are required, and the rubber industry is called upon to make them, while at the same time providing essential products for the home front.

Within the last few months the principal increase in requirements of the Armed Forces has been for large sized tires for combat vehicles and airplanes. It is needless to point out that the manufacture of these not only requires substantially greater quantities of rubber, tire cords, and other components, but has imposed upon the industry the necessity of obtaining new equipment with which to produce these tires. It has also accentuated an already very difficult manpower problem.

While the number of tires required in 1944 is probably less than the total units produced by the rubber industry in any year prior to the war, a large proportion of present requirements is in the very-large-size tires. The result increases the strain upon the industry. The production of one large bomber tire cancels out the possibility of making several truck tires or up to thirty passenger-car tires.

Truck and Bus Tires. Truck and bus tires are one of the serious problems facing this country today. Overloading and, in many cases, higher-than-recommended speeds already have taken a serious toll of these tires. New tires cannot be produced in sufficient quantity in the immediate future to prevent an extension of the present shortage. The requirements of the Armed Forces absorb the first and largest percentage of new production. It is not the supply of synthetic rubber that will limit the making of the large sizes of tires, but the shortage of manpower, the shortage of high-tenacity rayon cord, and the current lack of adequate facilities in the industry, i.e., mills, calenders, tire building equipment, vulcanizers, and special large sized molds. Today the industry is making many of these large tires from the same material it always has used and will so do until more rayon is available.

To bridge the crisis in domestic transportation which this situation implies and keep

their industry in operation, the truck and bus industry must cooperate as never before. Overloading and speeding, especially on hot pavements, must be eliminated, and every tire carcass which can be saved by recapping must be so preserved. The length of time during which truck and bus operators can successfully do their job will depend upon the care given their tires.

PASSENGER-CAR SIZE TIRES. By the end of 1943 there will have been distributed during the year approximately 5,000,000 new synthetic tires; 4,500,000 pre-Pearl Harbor tires; 1,700,000 War tires made from reclaimed rubber; 3,800,000 used tires recovered from the collection of tires made last year and 2,200,000 emergency tires which may be serviceable for short distances. This is a total of 17,200,000 tires of passenger-car sizes for 1943—equivalent in service to perhaps 12,000,000 new tires, as compared with approximately 50,000,000 tires a year prior to the war.

Nationwide surveys show that the tires on passenger cars, light delivery trucks, taxis and farm vehicles are showing serious wear. The accumulated deficit, together with a less-than-normal obsolescence of cars, indicates a need of new tires of this type in 1944 of at least 30,000,000.

While 30,000,000 tires sounds like a large number, it should be pointed out that by the end of 1944 the country will have been on a starvation diet for three years, inasmuch as only 4,700,000 tires were released in 1942. Every owner of a car must come to the realization that he is now in a position of trusteeship for the benefit of the nation insofar as his present tires are concerned. To prevent further and more drastic restrictions in the use of motor vehicles, he must redouble his efforts at conservation.

Reclaiming and Recapping

The reclaiming and recapping parts of the rubber industry have done an outstanding job of expansion and production to meet the emergency. Camelback (the formed, compounded rubber tread stock) used to retread tires is still bridging the gap in tire production. Recapping material is now available in greater quantity than ever before. Buna S is being added to camelback, thereby making recaps last longer. There is no excuse for a good tire carcass being ruined by driving it to the point where fabric shows, and recapping is no longer fully effective. As stated before, recapping must continue to carry a large proportion of the country's transportation system through the serious period ahead.

At the close of 1943, there will have been distributed approximately 167,000,000 pounds of camelback for the recapping of passenger-car tires and 59,000,000 pounds of camelback for truck, bus, and Army tires. This compares with a total of approximately 105,000,000 pounds of all types of camelback distributed in 1942.

Conservation measures have been relaxed in too many localities. Speeds must be held to 35 miles per hour to avoid the increased ratio of tread wear resulting from higher speeds. Bruising and rough driving at high speed must be eliminated as every irreparable carcass injury reduces the available tire supply.

Maintenance of domestic transportation is essential. Pool use of cars to and from factories must continue and increase. The non-essential driver will not get a new tire in the visible future and can stay on the road only if he reduces his driving to bare necessity and recaps his tires on time.

Rationing

It has been the continued policy of this office to have restrictions and regulations only where and so long as necessitated by circumstances. In view of the increased shortage of new and used tires and in order that essential transportation be maintained, several changes have been made in the Tire Rationing Regulations. Without such action, serious disruption of war-essential activities would result. Primarily the changes have been put into effect to accomplish three purposes:

1. To restrict eligibility for tires, thereby decreasing effective demand and consumption.

2. To increase the available supply of tires by putting into service all tires which are capable of giving further service, regardless of how limited this service may be.

3. To stretch available tire inventories by extensive tire recapping.

The holder of an "A" gasoline ration book in the critical gasoline shortage area is not entitled to any sort of tire. The holder of an "A" gasoline ration book outside of the gasoline shortage area is entitled to a used tire only if he can show that part of his driving is occupational. The "B" book holder throughout the country can get a certificate for a used or emergency tire, but no longer can he get a new tire. Only those whose gasoline ration permits them to drive 601 miles or more per month can get new tires. *There are no restrictions on passenger tire recapping.*

Truck tire rationing is based on the use of the vehicle rather than on mileage. Tires are issued only to those vehicles used for purposes essential to the war effort or essential to the health and safety of the public. Vehicles not essential to the war effort, public health, or safety are classed as List B and may secure certificates for recapping only. Formerly List B vehicles had to be deemed essential to the community before they were permitted recapping, but in the interest of keeping tires on such vehicles from being worn beyond repair *all commercial vehicles are now permitted a certificate for recapping.* It is anticipated that the supply of truck-type camelback will shortly be adequate to permit the elimination of these certificates.

A farmer may establish eligibility for a farm tractor or farm implement tire, and also, in view of the shortage of such tires, when farm tractor or implement tires themselves are not available, he may secure a Grade III passenger tire for the front wheels or a used truck tire for the rear wheels. *There are no restrictions on the recapping of farm tractor tires.*

In order to simplify the tire rationing program, a new tire rationing certificate was put into use in July. This certificate represents a very substantial simplification both with respect to the issuance by the local boards and its use by the general public. Present restrictions may be expected to remain in effect until such time as the production of synthetic tires is of sufficient volume to warrant a relaxation of the eligibility requirements.

Statistics

The following tabulation shows in long tons actual use of crude and synthetic rubbers during the first three quarters of 1943 and estimates of requirements for the last quarter of 1943 and for the year 1944.

The following tabulation shows in long tons the crude rubber, natural latex, and synthetic rubber position for the United States and Canada at the end of 1943 and 1944.

	1943	1944
Inventory, January 1	443,000	205,000
New supplies:		
Crude	60,000	81,000
Synthetic	223,000	818,000
Total	736,000	1,104,000
Requirements	531,000	953,000
Balance, December 31	205,000	151,000

These data are shown graphically in Exhibit "C".[2]

To summarize, it is expected that the stockpile of crude and synthetic rubbers at the end of 1943 will amount to 205,000 long tons and by the end of 1944 to 151,000 long tons. It should be noted, however, that by the end of 1944 a large proportion of the stockpile will be in synthetic rubbers, and we will have less crude than the Baruch Committee considered an irreducible minimum. During 1944 restrictions on the use of crude rubber will be increased until the ultimate objective of practically complete conversion (all but a few large tire sizes, etc.) has been obtained, and we are able to live within our income of new crude receipts.

Conversion to Synthetics

Certain restrictions which prevented the use of synthetics in the manufacture of many products recently have been lifted. This action was taken to produce longer lasting products and because more synthetic rubber was being produced. The critical manpower situation throughout the country has made it imperative that every manhour be used to manufacture products which will give the longest wearing quality.

Recent orders permit the use of synthetic rubber in the manufacture of a wide range of industrial and consumer goods, and, in certain instances, where non-rubber substitutes have proved inadequate, synthetic rubber has been made available.

One of the principal functions of this Office has been to cooperate with industry's technical staffs to stimulate conversion from the use of natural crude rubber to synthetic rubber in thousands of products. These conversions are made only when products processed from synthetic rubber have demonstrated adequate performance.

The entire production of neoprene is now being used in products where conversions have already been made. Additional products using neoprene have been developed so that as certain military products are discontinued, the production of this rubber can be fully utilized.

Despite the fact that Butyl rubber has been available only for experimental and developmental work, many products have been developed to replace natural crude or other synthetics with Butyl as soon as it becomes available in quantity.

	1943				1944		
	Actual First Half	Actual Third Quarter	Est. Fourth Quarter	Est. Total	Est. First Half	Est. Second Half	Est. Total
Military	132,100	68,300	68,000	268,400	167,000	223,000	390,000
Trucks and buses	36,900	23,500	21,000	81,400	64,000	81,000	145,000
Passenger-size tires	5,300	13,200	24,000	42,500	78,000	106,000	184,000
Other indirect military and civilian	14,200	8,900	9,000	32,100	19,000	19,000	38,000
Total U. S. A.	188,500	113,900	122,000	424,400	328,000	429,000	757,000
Exports	24,400	16,100	33,000	73,500	70,000	76,000	146,000
Canada	17,600	7,500	8,000	33,100	25,000	25,000	50,000
Grand total	230,500	137,500	163,000	531,000	423,000	530,000	953,000

Obviously the largest use of rubber is for tires, tubes, and other automotive products. Buna S is carrying this load. At the moment the rubber industry has converted many such products in whole or in part to Buna S so that:

A. The use of Buna S is now standard for the production of tires for passenger-car sizes, motorcycles, industrial tractors, farm tractors and implements, wheelbarrows, bicycles, and truck and bus tires of the smaller sizes.

B. Except for certain over-the-road bus and truck tires, varying combinations of synthetic and crude rubber (10% to 30%) are being used on 10-ply 7.00 tires and on all mud and snow and standard highway 7.50 to 10.00 tires.

C. Up to the present time no synthetics are being used (primarily due to a shortage of rayon tire cord) in most sizes of highway truck and bus tires which are used in high speed, heavily loaded service, in truck and bus tires over 10.50 in size, in earth mover, rock service, logger tires, mud and snow tires 18.00 and larger, and in airplane tires of the larger sizes.

Some of the products mentioned above will have the synthetic rubber content increased by January first. Many other conversions already approved by the Armed Services and by industry will be made effective as soon as more rayon tire cord is available.

Whereas steady progress is being made in the conversion program, there are some properties of Buna S which result in the generation of excessive heat and make it doubtful if complete conversion to the synthetics can be effected until new polymers have been further developed and fully proven.

The problem of converting tubes to synthetic rubber has been made especially difficult because of the shortage of Butyl rubber. Buna S is being used in tubes for passenger-car, motorcycle, farm, truck and bus, and military tires. Crude must be used in certain tubes until Butyl or some other such rubber is in greater supply.

Synthetic rubber has now replaced crude for camelback used in retreading truck tires, and approximately 40% of synthetic rubber has been added to reclaim to improve quality of recapping in all other types of tires.

Larger quantities of special-purpose rubbers, such as Buna N, are being used. They are becoming of increasing importance because of their excellent special properties.

Relative Performance of Products Manufactured from Synthetics

Extensive testing facilities have been made available for the development of products made of synthetic rubbers, particularly for tires, tubes, and automotive accessories, which represent a large part of all requirements in the field. Products made of synthetic rubber are produced commercially only after performance tests have indicated that they will give adequate service. This does not necessarily mean that performance will equal that of the best crude rubber products made in the past, although in some cases improved performance has resulted.

Tires now being manufactured for military uses have been put into production with synthetic rubber only after exhaustive tests have been made by the Army, and their approval obtained. This approval is given only after the tire has shown that it will perform satisfactorily under conditions to which it will be subjected.

The Quality of Synthetic Rubber Tires. It cannot be overemphasized that heat, whether from hot pavements, or as the result of overloading or high speed driving, is and always has been detrimental to *any* tire. Furthermore it cannot be overemphasized that speed, quick starting, and quick stopping increase the wear of tires. The life of a tire at 35 miles per hour is 50% longer than 45 miles per hour, and three times longer than at 60 miles per hour.[9] Since speed produces heat, it not only increases tread wear, but also shortens the life of the tire carcass. The shortening of the life of the carcass is extremely serious, for whereas a carcass in good condition can be retreaded, a bad carcass blowout destroys all chance of retreading. The blowout therefore destroys manpower, rubber, tire cords, wire, and pigments and wastes part of the productive output of existing tire building machinery. This is true with any tire.

Two properties of Buna S compounds are, under certain high temperature conditions, inferior to those of crude rubber. When any rubber is submitted to repeated alternate compression or elongation, heat is generated. In the case of Buna S more heat is generated than with crude rubber. In the case of crude rubber compound at high running temperatures, there is a material loss of not only tensile strength, but, more important, of tear resistance. In the case of synthetic rubber compounds this loss is much greater. Consequently under identical running conditions the compounded synthetic stock will not at high temperatures stand so much abuse as will the natural rubber stock.

Despite these properties great progress has been made in building tires with synthetics, until today the following situations are found in properly made synthetic tires.

Passenger-Car-Size Tires. *Greater care must be given to synthetic tires than to crude rubber tires.* If properly inflated, properly loaded, and not abused, these tires can be driven at reasonably high speed over *smooth* roads to give 90% or more of the tread wear of first line pre-Pearl Harbor tires; *but* if hot, as a result of either hot pavements or high speed driving, these tires are more easily damaged than tires made with crude rubber, especially when driven under abusive conditions, such as hitting holes or rocks in the road, under-inflation, or overload.

Military Tires and City Service Truck and Bus Tires, Etc. With these tires the situation closely parallels that of passenger-car tires. They give excellent service. Fortunately overloading and driving at high speeds on hot pavements is not prevalent with these types of tires. The same is true with farm implement, tractor and industrial pneumatic tires. In the military tires the tread design is helpful for it minimizes tread cracking.

High Speed Over-the-Road Truck and Bus Tires. The most serious quality problem with synthetic tires is in those sizes of tires used in over-the-road service. Many constructions have been tested, and great progress is being made. Self-sacrificing cooperation between units of the industry has made this possible. With these tires three new elements come into the picture:

1. There is a close relationship between a tire size and the load it is expected to carry.

2. Because of its greater size and the greater thickness of carcass and tread, more heat is generated and these sizes run hotter.

3. Experience has shown that up to now it is not possible to build serviceable tires without rayon cord and some crude rubber.

When some crude rubber and rayon tire cord are used, together with the most promising of today's techniques, except in two respects the situation with these tires is not too radically different from that of the passenger-car and military tires. A crude rubber tire of these sizes, although permanently injured by overloading, will operate under an overload for a much longer time than a comparable synthetic tire. The same overload which would be carried for thousands of miles by a crude rubber tire may, on a hot road with medium speed, cause the blowout of a synthetic tire in less than half the mileage. An overload which might reduce the life of a crude rubber tire only 25% or even be carried through until the the tread was worn smooth may reduce the life of a synthetic rubber tire 50% or more and result in a blowout while there is still wear in the tread. In short these tires must not be overloaded. Their tire bodies contain priceless crude rubber, synthetic rubber, and rayon cord. Equally priceless manpower and manufacturing facilities have been used to build them.

Even when reasonably loaded it is essential that these tires be properly inflated and not subjected to abuse resulting from hitting holes or rocks in the road. As in the case of passenger-car tires, the avoidance of high temperatures is not the only reason for avoiding high speeds—speed accentuates the damage done by the occasional hole in the road and greatly increases tread wear.

If these tires are properly loaded and inflated, are not abused, and are driven at reasonable speeds, they can be retreaded and used again. Many can be retreaded more than once. The resulting extra mileage will cause them to give service closely comparable to that obtained with crude rubber tires under prewar average care and conditions. But if these tires are overloaded, or driven at excessive speeds, or abused, they will fail at low mileages. If so treated, there will not be enough materials, facilities, or manpower to make replacements, and transportation will fail. The drivers of these tires are destined to play an important part in the future of the "Rubber Program."

All of the foregoing sums up to the conclusion that if synthetic tires are properly used, the treads will give good wear and the tire bodies will stand up so that they can be retreaded. Until more tires are available, however, the careless driver will have to change his habits or stop driving.

Quality of Other Products. Buna S rubber is still inferior to natural rubber in tubes, particularly those used in tires where the rim equipment is of the drop center type. The best Buna S tube compounds still tear too easily when hot and are less resistant to abrasion than are natural rubber tubes, but by careful mounting and inflation they will run to high mileage, and few failures need result.

Buna S truck and bus tubes used on flat-base rims are giving many thousands of miles of service without difficulty although they are less resistant to heat and more subject to tearing and snagging than crude tubes.

From present data it appears that Butyl rubber will be the synthetic desired for most tubes. Such tubes will be better than those of natural rubber from the standpoint of holding air and will resist heat and tearing exceptionally well.

Buna S camelback produces excellent retreads. Here again, the wear resistance of a Buna S truck and bus tire retread will be 10% to 15% less than that of a top-grade rubber retread, but it will give equal or better performance than many of the natural rubber compounds in production before the war. To a large extent the success of the

[9] "Tire Wear and Tire Failures on Various Road Surfaces." R. A. Moyer, Iowa Engineering Experiment Station, Ames, Iowa. See p. 10.

retread is dependent upon the good workmanship of the retreader.

Research and Development

A large part of the synthetic rubber program, of necessity, was established on processes that had not been proved either by a pilot plant or by large-scale operation. An active program of research and development was therefore initiated in November, 1942, to test the processes so that necessary corrections and modifications could be made to improve the performance and quality of products. To carry out this experimental work, programs were initiated with industrial laboratories, particularly those of companies involved in the construction and operation of the various plants associated with the synthetic rubber program, as well as with many educational institutions. In most cases the latter organizations experimented on the long-range characteristics intended to improve processes.

One of the major fields of research and development related to raw materials. Pilot plant work was initiated on a number of the principal processes, and such studies have been of material aid to the operation of producing units. One of the main programs undertaken was the elimination of undesirable impurities present in butadiene from most petroleum processes. Several methods have been developed and are in use. These methods not only have made the purity of this butadiene satisfactory, but have also made the concentration processes operable.

For many of the processes, catalysts have been developed which appear to give improved performance and offer promise of bettering yields in present plants.

Great progress has also been made in the improvement of specifications for various materials, and a number of undesirable impurities have been classified and methods for their determination and control have been developed.

All of the styrene processes have operated upon a sufficient scale to assure workability. In the butadiene program, two main processes, the Carbide & Carbon process employing alcohol and the Standard Oil Co. of New Jersey process employing butenes, have operated most satisfactorily on a large scale. Other units are in the initial stages of operation, and within a few months their workability will have been ascertained.

An intensive government-coordinated research and development program has also been carried out in the laboratories of rubber companies and educational institutions on synthetic rubber reactions. Initially a large portion of this work was directed toward insuring satisfactory operation of the copolymer plants. Today the operation of these plants has progressed to a point where their ability to produce rubber is no longer the main problem, and for this reason more and more of the research and development effort is being directed toward improving quality. This effort has developed a number of modifications that are believed to be improvements over present processes.

Copolymerization facilities, intermediate in size between the laboratory and the full-size plant, are few. Hence evaluation of improved modifications has been slow. To expedite improvements in quality of synthetic rubbers, it has been decided to provide new intermediate-size polymerization facilities by the construction of a government-owned pilot plant at Akron. This unit will be completed within the next few months. The possibility of employing some of the small private plants now used for specialty rubbers is also under consideration. All this work should develop the possibilities of new synthetic rubbers. If any of them prove to be more favorable than the present Buna S, immediate steps will be taken to establish their production on a larger scale.

A government-owned evaluation laboratory is being built adjacent to the pilot plant in Akron. It will be used for the evaluation of rubber-like materials produced as a result of various government and private investigations. These facilities should be of material aid in expediting many development phases.

Further to broaden the research program, this Office is sponsoring the construction of several small pilot units to be equipped with five-gallon polymerization reactors. A certain number of these reactors will be installed in the Akron pilot plant and will be used to evaluate large numbers of suggested methods of improving quality which are not sufficiently developed to justify large-scale production and tests. Others will be placed with various rubber, chemical, and petroleum companies and educational institutions which agree through their own research to further the program.

Manpower

Manpower is a serious problem throughout industry today. The production of rubber products and raw materials is being delayed through manpower dislocation.

An important part of the rubber processing industry is located in two serious manpower shortage areas, Akron and Los Angeles. A large proportion of trained labor is required by the rubber industry, and in many instances men of substantial physical strength are needed to handle the heavy weights of truck and airplane tires; smaller men or women cannot do this type of work. Therefore the rubber industry is not only in competition with other industries, but many of the men it most needs are those needed by the Army.

This Office is working closely with the War Manpower authorities in Washington and in various regions and is keeping them informed of the manpower problems throughout the industry. The rubber manufacturing industry has organized a group that is giving all its time to this problem. While this Office can be of assistance in the over-all manpower problem, it must remain up to the manufacturing industry itself to work out its immediate manpower problems with the various government agencies involved.

In the field of labor relations, management and leaders of labor have indicated a willingness to cooperate to increase output per manhour, to reduce absenteeism, and to improve operating conditions and increase efficiency. A very definite proportion of the expected shortage in tires in 1944 can be averted if this cooperation is translated into increased production. In this effort labor and management, working together, will contribute very materially to the general war program.

Feed Stocks

The principal feed stocks used by the rubber program are benzol, alcohol, and butylenes from petroleum. The first is used for making styrene and is available in the necessary quantities. The Chemicals Division of the War Production Board has the responsibility for supplying us with alcohol and assures us of a sufficient supply. The butylenes used for the program are produced by the catalytic cracking of petroleum and are equally useful in making high-octane gasoline or synthetic rubber. Under normal conditions they would be readily available. Where plants of two tremendous programs are being built simultaneously and are so closely meshed as are the high-octane gasoline and butadiene-from-petroleum programs, it is inevitable that from time to time either supply of or demand for butylenes will run ahead of the other. This has been the case and will continue to be the case for a few months. Under today's conditions where high-octane gasoline is very short, these butylenes could be used to make aviation gasoline ingredients. However we are assured by the Petroleum Administration for War that we will receive our basic requirements. We have no fear as to their availability.

Costs and Prices of Synthetics

It is too soon accurately to predict ultimate costs of the various synthetics and the raw materials that go into them. As of today many of the feed stocks are so new that it is almost impossible to predict their ultimate prices in a competitive peacetime economy. But it is safe to say that many of them will be available after the war at much lower prices than were ever contemplated before the war. Every day sees improvements in processing, operating, and management efficiencies, but it will be a great many months before optimum efficiency is reached. The alcohol plants are now using alcohol costing several times prewar costs. Under today's conditions there is no time to determine the byproduct values that unquestionably lie hidden in the wastes from many of the plants, particularly the butadiene-from-alcohol plants.

All of these factors will affect future direct manufacturing costs. Postwar amortization and financial charges will be affected by the extent to which abnormal, as well as normal, costs of building the program are written off as "cost of war." The raw materials from some sources are cheaper than the same raw materials from other sources, but the conditions may be reversed after the war. Some of the processes may not be economically competitive under postwar conditions. Others have every right to hope for a part in a permanent postwar picture. Certain combinations of low-cost raw materials probably will give direct cost for Buna S that will be less than 15¢ per pound.

The same general situations influence the average cost of the crude rubbers so that with both crude and synthetic the 1944 new supply will be made up of some very cheap and some abnormally high-priced tonnages. Faced with this situation the most practical approach has been to average all of the costs of *all* of the synthetics under present conditions and *all* of the crudes now being obtained and then price the various rubbers in such a way that those who are required to use any particular synthetic are not at a serious disadvantage when in competition with those using another.

Based on the above reasoning, crude and synthetics used in making government products are priced per pound as follows:

	Cents
Crude rubber	40
Neoprene (GR-M)	45
Buna-S (GR-S)	36
Butyl (GR-I)	33

This office initially recommended a uniform price policy. Being forced, however, to accept certain limitations as to ceiling prices of civilian consumer goods placed upon the Office of Price Administration by statute and Executive Order, we and the Rubber Reserve Co., agreed with the Office of Price Administration in March to the establishment of a civilian price schedule lower than the above. The advisability of continuing this policy is now being reviewed. This Office has again recommended a uniform price schedule based upon that currently pertaining to government use.

Patent Agreements

Shortly after Pearl Harbor the Rubber Reserve Co. entered into agreements with a large number of private companies covering the exchange of patent rights and technical information in the fields of Buna rubber, butadiene, and styrene. Rubber Reserve Co. also made patent arrangements with Standard Oil Development Co. and E. I. du Pont de Nemours & Co. with respect to the manufacture of Butyl rubber and neoprene, respectively. These agreements have served as a basis for the pooling and exchange of technical information necessary to the program and as a basis for the cooperation by the participating companies in the development of improved processes and products, as well as for the settlement of the government's possible liability for infringement of patents. With respect to butadiene and styrene, a small part (⅛¢ per pound) of the fees paid to operators was earmarked to cover royalties, and provision was made for settlement within this ceiling royalty of claims between the companies involved for the use of technical information and patents. Butyl rubber operations were made royalty-free during the war, and royalties may be payable thereafter, depending upon the extent to which Butyl rubber manufacture is carried on by the government postwar. In the case of neoprene, arrangements were concluded with the University of Notre Dame, effecting very substantial reductions in the royalties otherwise payable. No other neoprene royalties are to be paid during the war.

The original arrangements for the exchange of patent rights and technical information in the field of Buna rubbers were effected under an agreement with the Firestone Tire & Rubber Co., B. F. Goodrich Co., Goodyear Tire & Rubber Co., United States Rubber Co., and Standard Oil Development Co., such companies having contributed most to developments in this field and then being regarded by Rubber Reserve Co. as in the best position to develop the production of Buna rubbers on the tremendous scale necessary. Under this agreement Rubber Reserve Co. received royalty-free rights from the four rubber companies, and Rubber Reserve Co. and the four rubber companies received rights from Standard Oil Development Co. which are royalty-free until six months after the war, but subject to small royalties thereafter until September, 1951. Rubber Reserve Co. has the right under the agreement to permit outside parties to operate under its license, and arrangements have been made for such operation by three groups of smaller companies. These groups are known as the Copolymer Corp., made up of the Armstrong Rubber Co., Dayton Rubber Mfg. Co., Gates Rubber Co., Mansfield Tire & Rubber Co., Lake Shore Tire & Rubber Co., Pennsylvania Tire & Rubber Co., Sears, Roebuck & Co.; National Synthetic Rubber Corp., made up of Hewitt Rubber Corp., Lee Rubber & Tire Co., Hamilton Rubber Co., Goodall Rubber Co., Inc., Minnesota Mining & Mfg. Co.; and the General Tire & Rubber Co. in association with the General Latex & Chemical Co.

Most of these patent agreements have provided for the licensing of purchasers or lessees of government-built plants after the war. Rubber Reserve Co. is preparing a digest of its Patent Agreements, and printed copies will shortly be available upon request which should be directed to the Office of Rubber Director.

Arrangements have also been made by Rubber Reserve Co. covering the grant of transferable royalty-free rights in the synthetic rubber field under patents on inventions made in the course of research financed by the government.

As the program developed, it was felt that the arrangements made in the field of general-purpose Buna rubbers were not adequate, and that provisions should be made to expand the benefits of the patent agreement in this field so that they might be made available after the war on a wider basis and in such manner as to encourage general cooperation throughout the industry in the development of better general-purpose Buna rubbers, that is, Buna rubbers useful for the manufacture of tires and other principal rubber products.

Owing to the background and diversity of competing interests in this field, it proved difficult to secure a suitable amendment of the existing agreement. Early in 1942, however, Standard Oil Development Co., which controls the more important patents, offered to grant for the life of their patents to Rubber Reserve Co. a royalty-free license covering Standard's patents and improvements in the field of general-purpose Buna rubbers, insofar as such patents and improvements related to matters developed prior to the end of the war. The offer included the right in Rubber Reserve Co. to grant royalty-free sublicenses to other companies undertaking to assist in the program and agreeing to grant corresponding rights to Rubber Reserve Co. Acceptance of this offer, which was consummated on August 4, 1943, removed all obligation on the part of the government to pay royalties to Standard in the field of general-purpose Buna rubbers, with respect to patents on all inventions and improvements made prior to the end of the war, and made it possible for others who contribute to the rubber program to obtain similar free licenses in this field for operations both during and after the war.

Because of the possible interest of the Alien Property Custodian in certain of the patents of Standard, arrangements have also been made under which the Alien Property Custodian has made available licenses and licensing rights to Rubber Reserve Co. over a field including the field of general-purpose Buna rubbers. Companies executing the standard form of Cross-License Agreement with Rubber Reserve Co. therefore receive licenses in the field of general-purpose Buna rubbers under patents affected by Vesting Orders of the Alien Property Custodian, under patents growing out of the research program financed by Rubber Reserve Co. in this field, and under the patents of all other companies executing similar Cross-License Agreements, including Standard.

Of the four principal rubber companies entering into the original Buna rubber agreement, The Firestone Tire & Rubber Co., The Goodyear Tire & Rubber Co., and United States Rubber Co., have already entered into the new standard form of Cross-License Agreement with Rubber Reserve Co. Execution of the standard form of Agreement is also under consideration by a considerable number of other companies. These companies, and any others which have not been contacted, but which feel they can make a helpful contribution to the program, are free to signify their desire to enter into the Agreement. Under the protection of this standard form of Agreement, arrangements will be made for further development and for a wider interchange of technical information than was originally possible.

As of today, therefore, and as the result of the arrangements made pursuant to Standard's offer, the Rubber Director is in a position to say to any company willing to assist in the development of better general-purpose rubbers of the Buna type that, in return for the contribution of its "know-how" and patent developments, it can enjoy free rights under the patents of Standard and most of the other companies who have been, and will be, working in this field. It is hoped and believed that this background will lead to the development of improved Buna rubbers and to the solution of the technical problems not yet wholly solved.

BRADLEY DEWEY
Rubber Director

November 10, 1943.

Wiegand on Carbon Black

THE Rubber & Plastics Division, Montreal Section, Society of Chemical Industry, held its second meeting of the season on November 12 at McGill University, Montreal, P. Q., Canada. A dinner at the Berkeley Hotel was attended by 37 members, and almost 70 were present at the meeting which followed.

W. B. Wiegand, research director, Columbian Carbon Co., spoke on "New Developments in Colloidal Carbons." He was assisted by W. A. Ladd, also of the research department of Columbian Carbon, who demonstrated the latest methods of dispersion and mounting of pigments including carbon black for analysis by the electron microscope. The speaker first gave some of the history of colloidal carbons, which dates back to the Ancient World, discussed Chinese discoveries, the evolution of impingement, and the situation in 1910. He then covered five modern developments, the first was reenforcement, including the Anglo-American discoveries, the effect on transportation, and modern theories of the mechanism of reenforcement. The increased demand for furnace blacks rather than channel blacks by the rubber industry was next considered, and new furnace black developments were explained. It was indicated that the trend toward increased consumption of furnace blacks was expected to continue. The next subject was a description of pH and carbon surface chemistry in which the cause of pH, hydrolytic adsorption, preferential adsorption, and chemisorption were emphasized. The electron microscope and its use in definitely establishing the spherical nature of colloidal carbons and the measurement of carbon surface area were then treated. In this connection it was mentioned that recent studies of various synthetic latices had established their particle size. Carbon network structure was the last theory covered, and it was pointed out that by means of the electron microscope it has been learned that some of the newer furnace carbons have a network structure. In conclusion, the present-day carbon spectrum with information on surface, pH, and structure for various grades was explained.

A joint meeting of the Division with the Montreal Section, S. C. I., will be held December 15 at the Ritz Carlton Hotel, starting at 8 p. m., when H. Mark, of Brooklyn Polytechnic Institute, will speak on "Some Theoretical Aspects of the Synthetic Rubber Program." Dinner at 6.30 p. m. will precede this meeting.

It should also be mentioned that the talk by Mr. Wiegand was also given before the Ontario Rubber Section of the Canadian Chemical Association in Toronto on November 17 before 65 members and guests.

EDITORIALS

Natural Rubber Procurement Falters

THE magnificent achievement of building in the short time of two years an American synthetic rubber industry which will produce 818,000 long tons of rubber during 1944, according to Rubber Director Bradley Dewey in "Progress Report No. 4," will undoubtedly be looked upon for some time as one of the major successful industrial efforts of World War II. Appropriate recognition will be afforded the various companies who have made significant contributions to this effort at a dinner in New York on December 8, 1943. The occasion will be the presentation to these companies, as representing the new American Synthetic Rubber Industry, of the 1943 Award for Chemical Engineering Achievement. This award is made biennially by the Committee on Award, which is composed of leaders of chemical engineering education.

Those who have seen these new synthetic rubber plants in operation and the rubber actually being produced have an even greater appreciation of the job that has been done. However, when we consider the problems of using this new large volume of synthetic rubber in the production of finished rubber products, we realize that there are some vitally important products which continue to require appreciable amounts of natural crude rubber. The most important of these are large, heavy-duty, high-speed truck and bus tires and airplane tires in the larger sizes. It is indicated in "Progress Report No. 4" that the use of greater amounts of synthetic rubber in some of the products will be made effective as soon as more rayon tire cord is available, but it is also stated that there are some properties of Buna S which result in the generation of excessive heat and make it doubtful if complete conversion to synthetics can be effected until new polymers have been further developed and proven. It is also stated that with high-speed, over-the-road truck and bus tires experience has shown up to now that it is not possible to build serviceable tires without rayon cord and some crude rubber.

Imports of natural crude rubber for 1943 are estimated as 60,000 long tons, again referring to "Progress Report No. 4"; but the reports of 13 newspaper correspondents recently returned from an inspection of the Rubber Development Corp.'s procurement program in South America indicate that if we obtain 30,000 long tons of rubber from this source in 1943, we will be very fortunate. In 1912 under the stimulus of rubber at an average price of only slightly less than a dollar a pound Brazil produced 42,100 long tons of rubber. In mentioning natural rubber procurement "Progress Report No. 4" makes the following statement:

"As a result of the creation by the President, of the Office of Foreign Economic Administration, all American development and procurement programs in foreign countries have become its responsibility."

The executive order by the President of September 17, 1942, following the recommendations of the Baruch Committee said in part: "The Chairman of the War Production Board is authorized and directed to assume full responsibility for and control over the Nation's rubber program in all its phases, including, but not limited to: technical research and development, *importation, purchase . . .*"

It would seem that the intent of this executive order of a year or more ago was to place the major responsibility for natural rubber supplies with the Chairman of the War Production Board or his Rubber Director, rather than in the hands of another agency concerned with the procurement of many other more or less unrelated materials. It is evident that Rubber Director Dewey appreciates the seriousness of the crude rubber situation when he says in his latest report:

"The present crude rubber stockpile together with new imports from those tropical countries remaining in United Nation's hands, must carry us through. It is a difficult problem."

In order to improve the situation on natural rubber procurement the Rubber Director should initiate a review and, if necessary, recommend a reorganization of this program. If he does this with the same efficiency and thoroughness he did with the synthetic rubber program, the achievement in providing synthetic rubber will not be weakened by our inability to obtain the necessary natural rubber to use with it for certain essential products.

Holiday Greetings

AS THE eventful year of 1943 draws to a close, INDIA RUBBER WORLD and its staff take this opportunity to wish its readers the best of everything for a Very Merry Christmas and a Happy and Prosperous New Year.

During the past year we have seen the national war effort both at home and on the worldwide battlefronts gradually take shape and produce results that have been beyond our greatest expectations, in spite of the many difficulties and obstacles that have had to be overcome. The war is still far from being won, and although there may be changes in direction and type of our efforts during 1944, it may be that we will be called upon to perform even greater miracles before our enemies will have accepted the inevitable and another New Year is upon us.

The rubber and other industries associated with it in one of our major wartime efforts have accomplished the impossible in building and putting into operation an American Synthetic Rubber Industry in the course of the last two years. During 1944 the problem of using the present or modified future products of this new industry to manufacture rubber goods of equal or superior quality to those made from natural rubber must be solved, for upon the degree of success that is obtained here depends the postwar future of the whole rubber industry in this country.

STATEX

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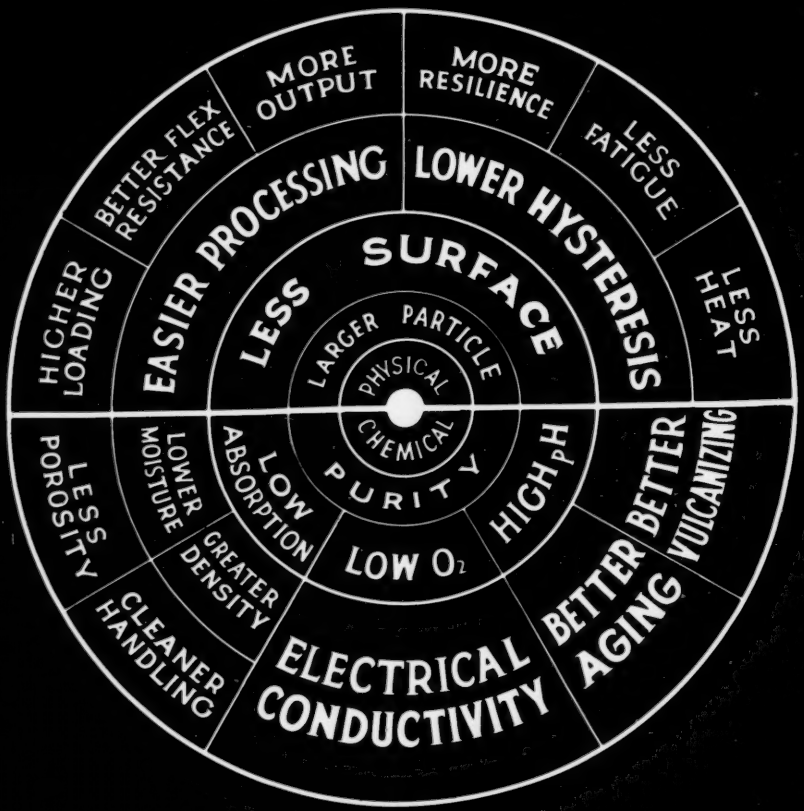

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What the Rubber Chemists Are Doing

Important Research Results Discussed at A. P. S. Symposium

THE symposium on the physics of rubber and other high polymers held in connection with the two hundred and fifty-seventh meeting of the American Physical Society at Northwestern University, Evanston, Ill., November 12 and 13 was outstanding in the scope of the subjects presented and the importance of the results reported when one considers their significance to the future developments of the rubber industry. Listening to the papers presented at this meeting after having recently heard those given before the October meeting of the Division of Rubber Chemistry, A. C. S., it appeared to the editor of INDIA RUBBER WORLD that a joint meeting in the near future of the divisions of the two societies having to do with rubber research and development might be mutually advantageous.

Much credit must be given to Warren F. Busse for the organization of this symposium, which was without precedent in A. P. S. history and revealed the value to the industry in a concrete way of the contributions of its members.

Several Speakers at the Society Dinner

The dinner of the Society was at the Georgian Hotel in Evanston, November 12. George B. Pegram, of Columbia University, was toastmaster and first introduced Franklin D. Snyder, president of Northwestern University. President Snyder welcomed the Society to Northwestern and in his talk emphasized the fact that the control of educational policies in the universities for the next few years would probably be mostly in the hands of the scientists and pointed out that they have a definite responsibility in this period in trying to convince students that a study of the sciences was not limited to the training of mere technicians, but was a field which welcomed those who could have and would work out original ideas.

The next speaker, Henry Crewe, a past president of the Society, described its origin at Columbia University in 1899 and the contributions to the science of physics as well as his associations with some of the original members of the Society.

K. K. Darrow, A. P. S., secretary, was called upon for a few words, after which he introduced Dr. Busse, who spoke briefly of the decision of the Council of the Society to approve the formation of a new Division of Rubber, Plastics, Textiles & Other High Polymers within the American Physical Society. Dr. Busse expressed the hope that a new and greater recognition of the work of the Society would be the outgrowth of this Division.

R. Bowling Barnes in his talk emphasized the necessity for the physicist so to direct his work as not to become bogged down in the maintenance of the tools of the physicist and other scientists, but to work with the prime objective of determining the fundamentals of the many scientific advances of the present day with particular reference to those developments in actual industrial use.

Majority of Papers on Rubber

Of the 16 papers presented, ten dealt with research and development problems having to do with rubber, either natural or synthetic. The summaries, as given below, were prepared from abstracts as furnished by the authors and the Society and also from notes taken at the symposium.

The first paper, **"Present Status of Theory of Elasticity of Rubber"** by H. M. James, of Purdue University, reviewed some of the most important points of the work of the speaker and Eugene Guth, of the University of Notre Dame, as presented in the October, 1943, issue of the *Journal of Chemical Physics* under the title of "Theory of the Elastic Properties of Rubber." Previous discussions of the kinetic theory of rubber elasticity have dealt with individual long-chain molecules, but this theory in addition to a detailed treatment of the individual chains presents a clear-cut model of the bulk material. The elasticity of the rubber molecule as a very long unbranched flexible chain of isoprene groups may be treated by the method of statistical mechanics. For a flexible chain the internal energy is completely independent of the configuration of the chain, and the tension in the chain was shown to be proportional to the absolute temperature. Discussed from the point of view of kinetic theory, the restoring forces in rubber may be considered as due to the thermal agitations of the long chains and their tendency to curl up under the influence of thermal agitation. Rubber in the lightly vulcanized state was considered to consist of a coherent network of flexible molecular chains, (these involving a considerable fraction of the total material) together with other molecules not actively involved in the network, but acting like a fluid mass through which the network extends and in which it moves with Brownian motion. The idea of an effective internal pressure was advanced and discussed. Vulcanization was stated as appearing to consist of the reenforcing of cross-links already present in raw rubber and the introduction of new cross-links.

L. A. Wood and F. L. Roth, of the National Bureau of Standards, offered the paper **"Stress-Temperature Relations in Natural Rubber."** Stress-temperature relations at constant elongation were studied in a pure gum vulcanizate of natural rubber in which butyl zimate was used for acceleration. These studies yielded information useful for calculations involved in the theory of elastic behavior and furnished practical data regarding tensile properties at different temperatures. The crystallization of the rubber which occurs on stretching was a factor of considerable importance in the explanation of the results obtained. The specimens were stretched and first held at a constant temperature of 25 or 70° C. for about two hours. The amount of flow was judged by the nature of the stress-time relation and by the amount of permanent set, measured at the conclusion of the experiment. By both criteria the flow of this compound of natural rubber at 70° C. was judged excessively large, and less reliance was placed on the results obtained at 70° C. than those obtained at 25° C., where the flow was not significant. The change of stress with time at the end of two hours was small enough to be without influence on later results, except when the flow was excessive or when the stretched rubber continued to crystallize. After relaxation at 25° C. for two hours at elongations of 150% and less, no evidences whatever of crystallization were found during the time of the experiments. At elongations of 500% and more the crystallization which occurred during stretching and in the first few minutes thereafter was so complete that the stress soon became independent of time. After relaxation at 70° C. both the upper and lower limits of the range of elongations in which crystallization occurs during relaxation were somewhat higher. After about two hours of relaxation at constant temperature, the temperature was lowered to about —20° C. During these and other temperature changes the elongation was maintained at a fixed percentage by altering the length of the specimen in accordance with the linear thermal expansion of unstretched rubber. The stress-temperature relations obtained in this way were always linear and reproducible on successive runs, except when the flow was excessive or when the stretched rubber continued to crystallize. The slopes of the stress-temperature lines and the values of the stress at any temperature depended upon the temperature at which relaxation was carried out. The higher the temperature of relaxation, the lower the value of the slope and the lower the value of the stress at a given temperature below the relaxation temperature. After completion of an experiment the unstretched rubber required a period of recovery before the stress-temperature relation characteristic of its original state was attained for elongations and temperatures lower than those existing during relaxation. The recovery period was of the order of days at room temperature and could be considerably reduced if the unstretched rubber was heated for a short time at 100° C.

W. B. Wiegand and H. A. Braendle, of Columbian Carbon Co., next discussed **"GR-S, an Elastically Inverted Polymer."** It was stated that at low elongations, for example, 50%, GR-S has a greater hysteresis than natural rubber. At elonga-

tions approaching failure, the reverse is found. Flexed to these higher elongations, as at the apex on the flex cut of tire treads, GR-S does not relax as does natural rubber. This failure of GR-S to relax is the equivalent of a 6:1 leverage of the tearing force operating at the apex of the cut. This coupled with the high negative coefficient of tensile strength of GR-S and its high heat build up at low elongations was offered as an explanation of the rapid cut-growth failure of GR-S treads.

J. H. Dillon, I. B. Prettyman, and G. L. Hall, of Firestone Tire & Rubber Co., in their paper, **"Hysteretic and Elastic Properties of Rubber-Like Materials under Dynamic Shear Stresses,"** reported on the nature of hysteresis in products as pneumatic tires, solid tires, and transmission belts and showed how the requirements of a laboratory test for evaluating the hysteretic characteristics of natural and synthetic rubber stocks were determined. The significance of various definitions of the "hysteresis defect" in rubber-like materials was discussed. A forced resonance vibrator in which rubber samples are deformed in shear at frequencies of 20 to 300 cycles/sec., shear strains of 0.05 to 0.35, and temperatures of −20 to +120° C. as described.

The dynamic shear modulus G and the hysteresis indices $\omega\eta$ and η were found to be nearly independent of dynamic shear strain and the height to diameter ratio of cylindrical samples; whereas other investigators, employing compressive vibrations, had reported a marked dependence of modulus and friction upon dynamic strain and "shape factor" for tread-type stocks, it was stated. In agreement with previously reported work, G was found to be independent of frequency, and $\omega\eta$ only slightly dependent upon frequency. Experimental results obtained with natural rubber and GR-S gum and tread stocks, as well as with stocks based on Buna S copolymers with varying monomer ratio and on X-type Butaprenes, neoprene, and Butyl rubbers were presented.

M. Mooney, W. E. Wolstenholme,[1] and D. S. Villars, of United States Rubber Co., in **"Drift and Relaxation of Rubber"** stated that drift tests lasting eight years had been carried out on rubber blocks in compression at 35° C. Rate of drift, initially high, attained a low constant value in 200 days or less. Rate of drift is reduced still further when the increase in deformation due to drift alters appreciably the area of stress. The initial, rapid drift was termed transient drift; and the slower constant drift was termed steady drift. Drift varied considerably with type of accelerator in the compound; Ureka gave the lowest drift of the accelerators tested. The new method developed for measuring stress relaxation in tension measured stress to 0.1% by the resonance frequency of lateral vibrations of the stretched sample. Relaxation measurements were reported on soft vulcanized rubber at elongations from 10 to 600% at 35 and 70° C. The experimental data can be fitted by a two-term stress equation of the Tobolsky-Eyring form representing two slip mechanisms, or transient and steady relaxation; but one of the parameters for transient relaxation must vary with elongation by the theory and seems inconsistent with it. Steady relaxation follows an exponential decay law; and this means that the residual stress goes to zero at infinite time. Other stress relaxation data were reported for rubber tested at 150% elongation, at temperatures from 35 to 113 C°., in air and in vacuum. Air, as compared with vacuum, produced little effect at 35° C., but at 70° C. and higher, the rate of steady relaxation was greatly increased. Thus oxidation appeared a major factor in steady relaxation at elevated temperatures. Transient relaxation was unaccountably increased by vacuum and by heat.

A new theory of transient relaxation has been developed. This type of relaxation was attributed to rupture of secondary chemical bonds or crystal forces, followed by longitudinal slippage of chain molecules, with partial or local equalization of tension in the chains. The secondary bonds or the crystallites then reform, and the rupture and slippage process is repeated. Transient relaxation is complete when the tension is completely equalized over the total length of each chain between cross-links. Equations were developed which showed that the relaxation time did not have a single value, or a narrow distribution of values, but was distributed continuously over a wide range of values. The initial high rate of transient relaxation and quick reduction to a much lower rate was thus at least qualitatively explained.

P. Debeye, of Cornell University, in **"Light Scattering in Solutions"** reported conclusions drawn from the optical analysis of solutions of polymers, since experimental procedures for the observation of scattering in these types of solutions were fairly easy to handle. The discussion was divided into two parts: the first dealt with particles about $^1/_{10}$ the wavelength of primary light, which would correspond to molecular weights between 10 and 100 million, and the other with particles larger than the wavelength. Considering small particles first, the two main characteristics of scattered light, if the scattering is due to a parallel primary beam, are (a) much backward and forward scattering and (b) the intensity of scattering is essentially proportional to the reciprocal fourth power of the wavelength. Starting with the simplest case, as treated by Lord Rayleigh, of an ideal gas of low density, a formula was shown for the relation between turbidity, the index of refraction, and the number of particles. A formula was next developed for liquids which incorporated the hydrostatic pressure and the compressibility. Passing then to solutions, fluctuations in concentration were shown to be proportional to osmotic pressure and formulae were reported relating the turbidity, the refractive index of the solvent, the refractive index of the solution, and the osmotic pressure. Therefore actual measurements of osmotic pressure as a function of concentration may be replaced by measurements of scattered intensity. In the limit for small enough concentrations van't Hoff's relation, $P = nkT$, holds; therefore a formula for the turbidity of dilute solutions due to changes in concentration or number of particles was developed. From the number of particles per cubic centimeter and the concentration, the mass of one particle and its molecular weight can be determined.

The effect of depolarization due to variations in the shape of the particles and correction factors to be applied in molecular weight determinations was also discussed.

With particles comparable in size to the wavelength of light, the scattered intensity will become more concentrated in the forward direction, and measurements of this dissymmetry in angular distribution can be used to obtain information on particle size. Also the method of W. Heller of following dependence of the intensity of scattering in a definite direction on the color of the primary light may also be used, it was stated.

R. Bowling Barnes, Van Zandt Williams, A. R. Davis, and Paul Giesecke, of American Cyanamid Co., in their paper on **"Physical Methods of Analysis of Synthetic and Natural Rubber"** showed how by the use of colorimetric methods using visible light and by means of infrared spectroscopy, it was possible to determine quite accurately the percentage composition and type of rubbers, both natural and synthetic, in captured German tires. It was pointed out that natural rubbers because of their origin could be expected to contain relatively large amounts of certain elements; while synthetic rubbers should contain only such amounts of these elements as might be accidentally introduced. From a large number of determinations of the phosphorous content of natural and synthetic rubbers, it was found that natural rubbers could be characterized by a high phosphorous content (average 400 p.p.m.) when compared with synthetics (average 20 p.p.m.). The method employed a visible light spectrophotometer for the analysis of a phosphomolybdate solution, and data recorded the percentage of natural rubber found in different samples of tires and parts of tires.

The use of infrared spectroscopy for the analysis of many types of organic materials was then explained. The infrared absorption spectrum (a plot of per cent. transmission as ordinate versus frequency in cm.$^{-1}$) of a material is a unique characteristic of the material and cannot be duplicated by another compound, it was stated. Also, so long as no intermolecular action occurs, the spectrum of a mixture of rubbers will be simply the spectra of the pure components combined in the proportion in which the materials themselves are present. Therefore an unknown mixture can be analyzed by direct measurement of the strength of the absorption bands unique to each component, or by comparison of the absorption spectra of the unknown with those of a series of known prepared standards. The infrared absorption spectra of various common types of rubbers were shown, and it was explained that by comparison of the absorption spectra of unknowns with these known spectra, the amounts and types of rubbers could be determined within about 5% to 10%.

The results on a few typical captured German tires were given, and the agreement of the infrared and phosphorous methods was surprisingly good in view of the spread in phosphorous content of various natural rubbers as previously determined. Ten

[1] Lieutenant, United States Navy.

samples of tread stocks analyzed reported natural rubber in only one sample; while ten samples of carcass stocks reported natural rubber in all cases, varying in amount from 25 to 100%.

Howard A. Robinson, Ruth Ruggy, and Elizabeth Slantz, of Armstrong Cork Co., presented a paper on **"Some Physical Properties of Commercial Polymerized Methyl Methacrylate."** The elasto-viscous and stress-optical properties of commercial methyl methacrylate polymer were measured. Between 150 and 225° F., Young's modulus drops from approximately 400,000 p.s.i. to roughly 200 p.s.i., and the material behaves like rubber. At 200° F. the viscosity is around 10^{12} poise, but this drops to 10^9 poise at 350° F. Below 200° F. three relaxation constants are necessary to describe the delayed elastic process, but two suffice between 200° F. and 275° F. At 300° F. one such constant is enough, and above this an instantaneous elastic and viscous flow is sufficient. The change in relaxation constants with temperature gives rise to an elastic activation energy of 7,000 and 12,000 cal./mol. Methyl methacrylate is optically negative, but has a stress-optical sensitivity about that of glass. The stress-optical coefficient varies markedly with temperature, showing a sharp maximum at 205° F. X-ray diffraction patterns show four rings corresponding to spacings of 2.19, 3.07, 6.7, and 14.7 Å. Some slight evidences of crystallinity are shown by diffraction patterns on fibers stretched at 200° F. Fibers stretched at 300° F. show a lesser amount of order in agreement with birefringence studies.

It was stated that the above studies are of interest in connection with a precise evaluation of the "elastic memory", so much in evidence during the forming operations. The unusual stress-optical properties are further evidence of the so-called second order transition points which have recently been discovered as a result of studies of the coefficient of volume expansion. The viscosity and activation energy values are in good agreement with practical results found in plant practice.

R. H. Kelsey and Dillon, of Firestone, described an extrusion plastometer for rubber-like materials in **"Rheological Properties of Natural and Synthetic Rubbers."** This plastometer measures the shearing stress at a predetermined constant average rate of shear and at a given temperature. In one filling of the extrusion chamber requiring about 10 cubic centimeter of sample, the average rate of shear is set at three or four different values in the range of five to 100 sec.$^{-1}$, and corresponding shearing stresses are read by means of a pressure gage. A plot of these data thus gives a complete rheological curve from a single determination. Typical curves are shown for *Hevea* smoked sheets, GR-S, and Butaprene NM, and for GR-S master batches and normal tread stocks. The effect of capillary geometry was investigated, and the effects of milling and of temperature upon the rheological properties of several rubbers were discussed. Typical data for GR-S polymers, master batches, and tread stocks, together with corresponding data obtained by means of the Mooney shearing disk plastometer and the Firestone constant-pressure extrusion plastometer were presented, and their relative significance discussed.

H. A. Schultz and R. C. Bryant, of The B. F. Goodrich Co., presented **"A New Extrusion Plastometer."** This instrument was developed since early studies of the processing characteristics of synthetic rubber indicated that it would be desirable to have a laboratory test to determine whether or not satisfactory tread slabs could be produced from a given batch by extrusion through a plate die. In factory extrusion the tread is thicker than the sidewalls and is extruded faster. Therefore tensile stresses are set up in the sidewalls and compressive stresses in the tread after the stock leaves the die. The material either flows to relieve these stresses, or it tears. Preliminary work indicated that the common methods of measuring plasticity were not adequate to measure or predict this tendency of certain stocks to tear, and it was decided to attack the problem by reproducing the physical processes in miniature under close control. The new extrusion plastometer was developed which by use of special dies and a device to apply tension to the extruding sample was found to correlate well with factory tubing runs and provide an excellent production control method for making synthetic rubber tread tubing.

I. Fankuchen and H. Mark, of Brooklyn Polytechnic Institute, in a paper on **"Crystallization of Long-Chain Compounds"** first pointed out that the general trend of X-ray techniques had been on the same level for the last 15 to 20 years and then presented some results of an investigation of new techniques which they had recently applied to rubber-like and high polymeric materials. The use of the micro technique was discussed and the value of a small beam to investigate local irregularities such as crystallinity was emphasized. In this method the diameter of the beam was small as compared to the diameter of the specimen. The desirability of working with monochromatic radiation for the evaluation of crystallinity was covered next. This had been considered as presenting so many difficulties that very little work had been done along these lines, but it was stated that actually a technique had been worked out which differed from previous methods only in requiring a somewhat longer time for the determination. Finally, the use of low-angle scattering in high polymer research, a new method in this country, was described, and its value in determining the size and shape of macromolecules pointed out.

S. D. Gehman and J. E. Field, of Goodyear Tire & Rubber Co., in **"Observations on the X-Ray Structure of Rubber and the Size and Shape of Rubber Crystallites"** declared that vulcanized rubber is composed of a cross-linked network of chain molecules, segments of which are sufficiently free and mobile in localized regions to form a crystal lattice upon stretching. The crystallites thus formed represent an automatic molecular mechanism for reenforcement and are analogous to particles of reenforcing pigment which increase the modulus, strength, and tear resistance. These effects depend upon the number of particles present and their size and shape.

X-ray determinations were made of the crystallite sizes in a series of vulcanized gum stocks using the Scherrer method, but calculating the diffraction broadening by the formula proposed by Taylor. Evidence was found that the crystallite size distribution was heterogeneous and included small crystallites which broadened the base of the diffraction peaks. It could be shown that a high degree of crystallinity in a compound was associated with small crystallite size. Both of these factors combine to give high modulus stocks. For different cures with a given rubber compounding formula, there is a definite correlation between the amount of combined sulphur and the crystallite size. This indicates that irregularities in the structure caused by the combined sulphur tend to limit the crystallite growth. This interpretation is preferred although the experimental evidence is not decisive as to whether or not lattice distortion contributes to the width of the spots. Significant conclusions can be drawn from the work in regard to crystallite formation in stretched rubber and effects of crystallites on the physical properties.

A. V. Tobolsky, of Princeton University, and Prettyman and Dillon also gave a paper on the **"Stress Relaxation of Natural and Synthetic Rubber Stocks."** Stress decay measurements at a constant elongation as a function of time of thin bands of gum and tread stocks of natural rubber, neoprene, Butyl, Buna S, and Butaprene N indicated the presence of both secondary and primary bond relaxation. Measurements of *Hevea* and Buna S stocks over a range of temperatures indicated complete decay in a time which became exponentially smaller with increase in temperature and which was independent of elongation. Oxidative scission was suggested as the mechanism of deterioration of the primary bonds. A commercial nitrogen atmosphere was shown not to alter the relaxation rate, suggesting that only a relatively small amount of oxygen was necessary to produce the same rate of scission as that obtained in an ordinary air atmosphere. An equation was developed which gave close agreement with the experimental results. For all the polymers in the various stocks tested, the activation free energy differed by less than ± 2.0 Kcals per mol from that of the *Hevea* stocks, indicating the same general type of reaction for all. However differences in observed times to relax to a given fraction of the original stress were shown to possess possible significance in the deterioration of the stocks in service.

H. S. Sack, of Cornell, in **"Hysteresis Losses in High Polymers"** pointed out that in most cases there was a considerable lag of strain behind stress upon the application of force to these materials and that the extent of this lag was a measure of the degree loss of elastic properties for a given polymer. The author described a method of examining the hysteresis of natural and synthetic rubbers by submitting them to vibrational forces at an elongation of 10% and determining the loss in energy resulting. It was suggested that the method might have practical application in tire evaluation or might aid in investigating the properties of various high polymers.

P. H. Emmett, of Johns Hopkins University, in **"The Measurement of Surface Area of Carbon Black by Low-Temperature Adsorption"** reviewed the development of this method which makes use of low-temperature adsorption isotherms of some inert gas, such as nitrogen, measured near the boiling point of the gas. The method has been used during the last few years for measuring the surface areas of metallic catalysts, soils, silica gel, charcoal, paint pigments, and carbon black. The surface areas are obtained by selecting on each experimental adsorption isotherm of the gas used, the point corresponding to a monolayer. A multiplication of the number of molecules required to form the single layer by the average area occupied by each adsorbed molecule yields a numerical value for the absolute area of a given weight of each adsorbent.

It was stated that particle size measurements on carbon black by the adsorption method were in good agreement with those obtained by the electron microscope except in cases where there was good reason to believe that the particles were porous. Mogul and Monarch carbon blacks and steam-treated lampblack were cited as examples of particles which have been shown to have porous surfaces from their adsorption isotherms. It was emphasized that the electron microscope, if properly used, is the best known tool today available for measuring particle size and determining shapes of particles too finely divided for observation by the ordinary microscope. On the other hand it was considered equally important to emphasize that the low temperature nitrogen adsorption method appears the most reliable means now available for obtaining surface areas of any finely divided or porous material including all types of carbon blacks. The surface area method has been shown to be applicable for identifying carbon blacks after the latter have been incorporated into rubber, since compounding apparently does not alter the particle size. A knowledge of the surface area of carbon blacks should be helpful in many, if not all of the uses to which carbon blacks are put, it was stated in conclusion.

R. F. Boyer and R. S. Spencer, of Dow Chemical Co., presented a paper, **"Second Order Transitions in High Polymers"**, concerned with the thermal expansion of high polymers, and particularly with the break in the volume-temperature curve which defines the second order transition temperature. Following the work of Ueberreiter and others, various polymers were investigated. Saran was studied in some detail in its amorphous, crystalline, and oriented states. It was found that the linear expansion normal to the direction of orientation is at least three times the expansion parallel to the orientation, for temperatures below the second order transition. Above the transition temperature the expansion is independent of direction in the sample.

The effect of molecular weight, external loads, and orientation on the transition temperature was pointed out. It was shown that the product of transition temperature times cubical expansion coefficient above the transition temperature is approximately constant and equal to 0.15 for most high polymers. The brittle point test was examined in its relation to the second order transition point. The two values are roughly the same for high molecular weights, but diverge markedly for low molecular weights. These effects were interpreted by viscous and elastic deformation mechanism for high polymers.

A. C. S. Activities

L. A. Group Annual Meeting

THE first annual meeting of the Los Angeles Group, Division of Rubber Chemistry, A. C. S., was held at the Mayfair Hotel on November 2 with 67 members and 35 guests present. Chairman Charles J. Roese presided and first introduced the guests; next the changes in the proposed by-laws were read, and after a motion by G. K. Norton, seconded by Carl E. Stanz, the Group voted unanimously to accept the changes and ratify the by-laws as proposed and read.

Mr. Roese then called for the reports of various committees, and the nominating committee posted the names of those nominated to serve as board members for 1944. Election for officers and board members will be carried out by letter ballot, and the results will be announced in our next issue. It was announced that the Group had secured the Pasadena Play House for the presentation of "Dark Eyes" for the December 7 Christmas theater party. The committee appointed to handle this affair, under the chairmanship of A. L. Pickard is composed of Victor Vodra, Ed Royal, W. Boswell, Charles Churchill, L. Jung, Robert Pfister, Mason Payne, J. Robbins, and W. Moon.

The technical program was in the form of a discussion of synthetic rubbers and their use by a panel of members of the Group with Moderator Phil Drew in charge. These members were: S. R. Corbett, Office of the Rubber Director; Griff Oliver, Oliver Tire & Rubber Co. (representing the ORD); R. D. Kettering, Oliver Tire; Chas. Lamb, West American Rubber Co.; Cliff A. Neville, United States Rubber Co.; Victor A. Vodra, R. T. Vanderbilt Co.; L. C. Weimer, W. J. Voit Rubber Corp.; and R. E. Hutchinson, Firestone Tire & Rubber Co. The various types of synthetic rubbers available and tests made by rubber plants on the different synthetics were described. Plasticizing, calendering, tubing, and extrusion were discussed. Covered also were tack, heat tenderness, tear resistance, cut growth, and abrasion. Curing times for molded goods was next discussed, followed by the quality of passenger and truck tires of synthetic rubber. The meeting was concluded with the showing of two motion pictures dealing with the war and the war effort.

Door prizes donated by J. P. Morath, of Naugatuck Chemical Division and Jack Britton, of Stanco Distributors, consisted of $10 in War Stamps won by Walter Boswell; $5 in War Stamps, Jack Bain; $3.75 in War Stamps, Bob Abbott; and globe and atlas, Maury Chisholm.

Chicago Group Sessions

A MEETING of the Chicago Group, Division of Rubber Chemistry, A. C. S., was held at the Morrison Hotel on November 19, attended by about 125 members and guests. The program featured a talk by R. H. Crossley, of Xylos Rubber Co., on "The Compounding and Processing of Butaprene", and Ensign Boaz, U. S. Navy, who spoke on some of his recent experiences in the South Pacific during the present war.

Mr. Crossley explained that there are two major types of Butaprene: namely, Butaprene S, the non-oil-resistant type, and Butaprene N, the oil-resistant type. At present Firestone is making no Butaprene S because the government plants began producing GR-S soon after the war began, and it is not probable that any more Butaprene S will be made for the duration. It will, however, be a post-war product. The discussion was devoted to the four basic types of Butaprene N now in production: Butaprene NX, a highly oil-resistant rubber which gives high tensiles, but is fairly hard to process; Butaprene NA, which is less oil-resistant, gives less tensile, but is easier to process; Butaprene NM, an all-purpose rubber which is the easiest to process of the three rubbers so far mentioned; and Butaprene NF, which is a special type made particularly for applications where cold resistence is of first importance. Slides were shown to illustrate the properties of these Butaprenes when varying amounts of accelerator, sulphur, filler, and plasticizer were used in the base compound. Some of the wartime applications of the Butaprenes were described, postwar possibilities discussed, and samples of some finished products exhibited.

The annual Christmas party of the Chicago Group will be held in the Terrace Casino of the Morrison Hotel on December 17. The committee in charge consists of: Jim Sheridan, New Jersey Zinc Co., and H. A. Winkelmann, Dryden Rubber Co., co-chairmen; Parker Highsmith, Bibb Mfg. Co.; Mel Vaughn, Wishnick-Tumpeer Co.; and W. F. Bernstein, consulting engineer. Entertainment is being arranged by Vorhees, and there will be the usual gifts for the ladies.

New York Group Christmas Party

THE annual Christmas party of the New York Group, Division of Rubber Chemistry, A. C. S., will be held December 17 at the Building Trades Club, 2 Park Ave., New York, N. Y. Attendance will be limited to 325 members and guests because of food and other difficulties. A cocktail hour beginning at 5:30 p. m. will precede the dinner, scheduled for 6:30 sharp. There will be no technical session. Special entertainment will be provided, and there will be the usual distribution of prizes. The report of the nominating committee will be made by the chairman, John DeC. Van Etten, of Vansul & Co., and officers for 1944 will be elected. Tickets for the party will be $3 for members and $5 for nonmembers and may be secured from the secretary of the group, B. B. Wilson, INDIA RUBBER WORLD, 386 Fourth Ave., New York 16, N. Y.

Akron Group Meets

ON NOVEMBER 5, 145 members and guests attended the dinner-meeting of the Akron Group, Division of Rubber Chemistry, A. C. S., at Portage Hotel and heard Harry E. Blythe, vice president of Goodyear Aircraft Corp., Akron, present "The Aircraft Story," during which he discussed aircraft past, present, and future. The speaker was introduced by the Group vice chairman, Walter Krantz. The chairman, A. E. Sidnell, presented to the gathering a special guest, F. D. Chittenden, chief chemist of the GR-S plant at Institute, W. Va.

GR-S Compounding Discussed

THE Buffalo Group, Division of Rubber Chemistry, A. C. S., heard R. Clifford Jones, of the New Jersey Zinc Co., speak on "Compounding of GR-S with Zinc Oxide" at its last formal meeting of the year, held at the Hotel Westbrook, Buffalo, N. Y., November 11. The talk covered the work of the past year and a half as carried out in the laboratories of New Jersey Zinc. Most of the work reported dealt with GR-S as it is being supplied by the government plants, although possible modifications of this polymer as well as some experimental polymers were also discussed. It was shown how with GR-S, by the proper selection of softness and plasticizers and the proper balance of curatives, quite satisfactory compounds could be prepared which had a high zinc oxide loading. The effect of surface treatment of zinc oxide, when used in GR-S, was also shown, and it was indicated that modification of the surface of the pigment played an important part in zinc oxide reenforcement. Mr. Jones introduced an innovation in the presentation of his talk in that he suggested that questions would be welcomed at any time. As a result because of the interest in the material presented, questions and discussions were almost continuous, and the speaker was congratulated on the excellent manner in which the subject was handled.

Group Chairman Burt Wetherbee announced the appointment of Harold Hedden, Al Davis, and P. A. Fortier as a nominating committee for officers of the Group for 1944. The nominees will be voted on at the Christmas meeting, to be held at the Westbrook Hotel on December 16. Dinner is scheduled for 7:00 p. m., and reservations must be made in advance through N. J. Cyphers, Hewitt Rubber Corp., 240 Kensington Ave., Buffalo 5, N. Y. A program of entertainment is being arranged by Jim Cranz, with Art Leard as master of ceremonies.

Nichols and Perkin Medalists

THE New York Section, A. C. S., has awarded the William H. Nichols Medal, given annually for notable achievements in chemistry, to Carl Shipp Marvel, professor of organic chemistry, University of Illinois, "for outstanding organic chemical contributions to the structure of vinyl polymers", used as synthetic plastics for transparent aircraft pieces and as blending agents in the chemical industry and as rubber substitutes. Presentation will be made at the March 10 meeting of the New York Section.

The American Section of the Society of Chemical Industry on November 15 designated Gaston F. DuBois, vice president of Monsanto Chemical Co., the next recipient of the Perkin Medal in recognition of his outstanding work in applied chemistry. Dr. DuBois, who has been with Monsanto since 1904, has contributed to practically every technical development of the company and its subsidiaries, including vanillin, intermediates, phosphorus, plastics, styrene, electrochemical separation of bismuth, and the development of the vanadium pentoxide catalyst in this country. The Medal will be given him at a dinner-meeting of the S.C.I. at the Hotel Commodore, New York, on January 7, presided over by Foster Dee Snell, chairman of the American Section. Francis J. Curtis, Monsanto vice president and Charles Allen Thomas, director of Monsanto's central research department, will discuss, respectively, the personal side of the medalist's life and his professional accomplishments.

Chemical Industry Medal Award

THE Chemical Industry Medal for 1943 was presented John J. Grebe, director, physical research laboratory, Dow Chemical Co., Midland, Mich., at a joint meeting of the American Section of the Society of Chemical Industry, the New York Section of the American Chemical Society, and the New York Section of the American Institute of Chemical Engineers, held at the Hotel Roosevelt, New York, N. Y., November 12. The American Section chairman, Foster Dee Snell, presided.

Ray H. Boundy, manager of the plastics division at Dow, spoke about the personal side of the medalist's life, and W. R. Veazey, research coordinator at Dow, discussed Dr. Grebe's accomplishments. The medal, awarded annually for valuable application of chemical research to industry, was given Dr. Grebe in recognition of his contribution to the solution of some of the very difficult problems connected with the automatic control of chemical reactions, particularly with reference to the anticipatory control necessary to the reactions. Presentation was made by Lincoln T. Work, following which Dr. Grebe gave an address on "Tools and Aims of Research."

In his talk he mapped out the fields of fruitful research, discussed the tools and methods employed, and emphasized the need of teamwork. Dr. Grebe pointed out that the physical concept of matter recognizes the excited vibrational state of the component electrons on one hand and ranging to the sluggish oscillations of the component large molecular masses on the other. Various phenomena, by which substances may be characterized for investigation, depend on the interaction with matter of various forms of energy which may be placed in frequency scales, including the electro-magnetic spectrum. As illustrations of the use of the various electro-magnetic frequencies, the speaker cited the measurements of the ultra-violet absorption of plastics, the use of X-rays in studying the composition and structure of many materials, and the use of the electron microscope, which fills the hitherto blind spot between the limits of X-ray observations and those of the ordinary light microscope.

Dr. Grebe stated that the present war effort has tended to accelerate radically developments and to shorten the time between inception and consummation and then went on to view some of the aims of research in the fields of aeronautics, electricity, and home construction. He stated that research should not be regimented, but is most successful when democratic and competitive with no director controlling more than one-tenth of the country's research. Undemocratic control of research and science allows evil application of invention to the perversions of the dictators at present responsible for the world turmoil.

Dinsmore on Rubbers, Plastics

AT A meeting of the Society of Plastics Industry in New York, N. Y., November 8, R. P. Dinsmore, vice president, Goodyear Tire & Rubber Co., spoke on "The Field of Synthetic Rubber vs. Natural Rubber and the Plastics." He first emphasized that the development of the plastics industry was based on compositions having a little or no extensibility, but that the extensive investigation of new resin families in recent years has resulted in the discovery of many useful materials with considerable extensibility. These developments have overlapped and dovetailed into the products of synthetic rubber research. As a result there has been a destruction of boundaries or blurring of definition of the respective fields of synthetic plastics and synthetic rubbers. The speaker stated that during the war period the rubber industry has been forced to use all available substitutes for natural rubber and has learned that the material which best does the job formerly done by natural rubber is natural rubber. He said, however, that there is a real value in distinguishing between rubbers and plastics and still greater value in knowing the reasons for the differences.

Dr. Dinsmore then defined the true plastic and the true rubber by saying that the requirements in the first case were ready moldability under pressure (or heat and pressure) and resulting stability of form. The requirements for rubber were, first, that it be plastic while it is being formed and manipulated and, second, that in its final form it be (among other things) highly extensible and capable of rapid elastic recovery from deformation. Since this latter requirement negatives the condition of plasticity, it presupposes the change of state brought about by vulcanization. The probable structural formulas for the various plastics and rubbers were then referred to and the greater width and thickness relative to length of the plastics as compared to the more attenuated chains of the rubbers suggested as a means of affording some understanding of a way in which polymers intermediate to plastics and rubbers, may exist and exhibit certain properties of each class.

The vulcanization of rubber and balata was discussed, and it was pointed out that if we wish we may take the extensibility,

elasticity, and heat stability range of a highly elastic rubber and arbitrarily classify any value for any of these properties, which falls below 50% of the corresponding value for the base rubber, as being a plastic property rather than a rubber property. "Thiokol" X, Plioflex, and GR-S were then compared with natural rubber on this basis, and Buna N and Butyl rubber also covered in a general way. It was mentioned that a natural rubber tread as its temperature rises from 82° F. to 200° F. maintains a constant elongation, but loses about 35% breaking tensile and that GR-S tread subjected to the same change of temperature suffers a loss of 35% of its ultimate elongation and a drop of 66⅔% in tensile. This serious difference between the natural and synthetic rubbers is accentuated by a similar drop in tear resistance of the latter amounting to about 60%. The sole compensating feature is that the hysteresis loss likewise falls off sharply, it was said.

Rubbers may be compounded and vulcanized in many ways, and it was pointed out that while natural rubber technique has been developed over many years, it would not be surprising if the best technique had not been developed as yet for synthetic rubber. While it is not safe to say that a rubber which will serve for tires will be satisfactory for any rubber use, it is nevertheless true that a large proportion of other rubber goods does not require so high a type of rubber.

Dr. Dinsmore said that it would be foolish indeed to expect a separation of the field of application of plastics and rubbers. The most that can be expected is a substantial separation of the two extremes. In the intermediate territory rubber goods formerly made from highly loaded, degraded, or hard-vulcanized rubbers may be made from intermediate rubber plastics and do a more effective job. Heels, soles, flooring, industrial molded goods are among the kinds of articles which may be first affected. The development engineers and chemists of the future have an intricate, but brilliantly promising task ahead, he said in conclusion.

Rubber Convention Reviewed for Northern California Group

THE regular monthly meeting of the Northern California Rubber Group, held the evening of October 28 at the Hotel Claremont, Berkeley, Calif., attracted about 40 members and guests. Principal speaker was Vic Vodra, of R. T. Vanderbilt Co., who along with several other Group members had recently returned from the Rubber Division, A. C. S., sessions in New York. Mr. Vodra gave a very comprehensive report on the papers presented, with particular regard to GR-S compounding. Then Russell Kettering, of Oliver Tire & Rubber Co., and D. C. Maddy, of Hycar Chemical Co., both of whom had attended the New York meeting, offered their comments. After a general discussion Arthur Barrett, rubber technologist at the Mare Island Navy Yard, abstracted the paper he had read before the Division of Rubber Chemistry, covering the effect of substituting 20 parts of domestic rubber for GR-S.

Two Types of GR-S

TO: Consumers of Synthetic Rubber
FROM: H. E. Simmons
SUBJECT: Two Types of GR-S

For your information the following two types of GR-S are available.

1. **GR-S-St.** This is regular, standard GR-S containing Stalite antioxidant. It is a new name for an old product, inasmuch as GR-S containing Stalite has been made for about a year. GR-S-St is offered for use in the manufacture of light-colored goods, or where a copolymer with minimum staining or discoloring properties is needed. This material is believed to be quite satisfactory for the uses mentioned, but there is no guarantee of any kind that it will be satisfactory.

2. **GR-S 85.** This is GR-S of a high viscosity, approximately 85 Mooney. It was developed primarily for use in the manufacture of compressed asbestos sheet packing where cements of controllable high viscosity are required. Several cement manufacturers have stated that this special high-viscosity type will produce more satisfactory cements than will the standard GR-S, and the material is therefore offered for use in cements generally. GR-S 85 is tough to handle on a mill or in a Banbury and is therefore not recommended for ordinary dry mixes.

November 9, 1943.

Presenting Dr. McPherson

Recently appointed chief of the Division of Organic and Fibrous Materials, National Bureau of Standards, Washington, D. C., to administer work on rubber, textiles, paper, leather, plastics, and other organic and fibrous materials, was Archibald Turner McPherson, whose training and experience well qualify him for the important post to which he has been assigned. Dr. McPherson had joined the Bureau in 1918 to work on gas chemistry. In 1919, however, he secured a position as an instructor in chemistry at Ewing Christian College, Allahabad, India, where he remained two years. Then in 1923, Dr. McPherson returned to the Bureau of Standards, to engage in research on the chemistry of rubber insulation. In 1930 he was made chief of the rubber section of the Bureau and directed and conducted research on electrical, mechanical, optical, and thermodynamic properties of rubber. His latest appointment came this summer.

Harris & Ewing

Archibald T. McPherson

Dr. McPherson was born in Marceline, Mo., February 22, 1895. He received an A.B. from Trinity University in 1914, an A.M. from the University of Texas in 1916, and his Ph.D. from the University of Chicago in 1923. His graduate work was done in chemistry, with physics the minor. The Division chief has also written numerous research papers dealing principally with organic chemistry and the electrical, optical, and thermal behavior of rubber.

He holds membership in the American Chemical Society, Philosophical Society of Washington, Sigma Xi, and Washington Academy of Sciences. His hobby is raising evergreen trees for distribution among suburban neighbors.

Dr. McPherson is married to Dr. Margaret Willcox, and they have three children. Their residence is at 19 Cleveland St., Kensington, Md.

R. I. Rubber Club Election

THE dinner-meeting of the Rhode Island Rubber Club was held at the Crown Hotel, Providence, R. I., November 19 with 79 members and guests in attendance. The election of officers for 1944 was held with the following results: president, Owen E. Lowe, Davol Rubber Co.; secretary, J. M. Scott, Henry L. Scott Co.; treasurer, F. S. Bartlett, United States Rubber Co. The executive committee consists of: Lowell K. Morrow, Anaconda Wire & Cable Co.; Hz E. Murch, Goodyear Footwear Co.; S. I. Strickhauser, United States Rubber; Daniel Rhee, Carr Mfg. Co.; M. J. Linn, Xylos Rubber Co.; W. Linnell, Sr., Collyer Insulated Wire Co.; S. J. Lake, Respro, Inc.; and H. W. Greenup, Firestone Rubber & Latex Products Co.

Following the election of officers, two films, "Rubber at the Rouge" and "Robots and Rubber," were shown through the courtesy of Farrel-Birmingham Co., Inc., Ansonia, Conn.

Magnesium Oxide for Neoprene Compounding

IN A memorandum from the Office of the Rubber Director by H. E. Simmons on magnesium oxide for neoprene compounding, issued early in November to rubber manufacturers, the Permanente Metals Corp.'s Permanente RR and Westvaco Chlorine Products Corp.'s No. 2665 heavy-calcined magnesium oxides were suggested as substitutes for the previously used x-light calcined MgO. In addition another source of supply for the heavy grade is the Schofield-Donald Company, 88 Shipman St., Newark, N. J., which reports that this grade should be very acceptable for rubber work because of the high degree of purity which it possesses.

UNITED STATES

Progress Report and Industry Stress Conservation; South American Rubber Program Surveyed

The executive committee of the tire division of The Rubber Manufacturers' Association, Inc., launched a national tire conservation and education campaign with a press conference at the Hotel Ambassador in New York on November 4. The manufacturers' advertising campaign then ran from November 7 through November 21 in more than 100 Sunday newspapers as well as in a national list of weekly papers and highway transportation journals. The theme of the campaign was that unless tire carcasses now in use are conserved and recapped as soon as the treads are worn smooth, many thousand cars and trucks will be laid up in the next few months for lack of tires. Also emphasized was the extra care required with synthetic rubber tires, particularly for truck and bus. Synthetic rubber tires are not yet an improvement over pre-war tires, but they will keep automobiles rolling through the emergency, it was stated. Our national stockpile of usable passenger-car tires of every description was reduced from 14,400,000 on January 1, 1943, to 5,250,000 (all kinds, including emergency tires) on October 1, and the truck tire stockpile has shrunk from well over 2,000,000 tires at the beginning of 1943 to 695,000 tires on October 1. We are now running 250,000 to 300,000 truck tires a month in the hole, and there is a demand for 7,326,000 passenger car tires for the last three months of this year which cannot be met, it was further stated. Thirty-eight tire manufacturing companies, large and small, representing 100% of the tire industry, participated in the campaign.

Progress Report No. 4[1] Issued

Rubber Director Bradley Dewey before the Senate Sub-Committee on Agriculture on November 3 reported on the quality of synthetic rubber tires, and on November 10, Progress Report No. 4 was issued, giving the present status of the rubber program. Under the "Basic Situation", the report stated that of the four major programs of the past year: (1) the increase of reclaim rubber production and retreading materials and facilities, (2) the construction and development of plants to produce synthetic rubbers and their principal raw materials, butadiene and styrene, (3) the expansion of the rubber manufacturing industry to process synthetic rubber into usable products, and (4) the expansion and conversion of allied industries to produce the necessary components of rubber goods, such as high-tenacity rayon tire cords, carbon blacks, etc., the first two programs are effectively behind us; while the other two are under way. Upon the speed of completion of the latter two, together with effective management and a sound manpower and labor situation, depends the time when this country will be able to get enough rubber products to maintain the irreducible needs of modern warfare and essential civilian transportation, the report said. The continued seriousness of the rubber situation was emphasized in pointing out that inventories of tires built up in peacetime have now been drawn down to an irreducible minimum; the tremendous requirements of the military forces have increased materially; and while new production will gain, it will have to wait for the gradual installation and manning of the expansions of other programs.

As of October 31, 1943, the program has progressed to the point where completed plants for making synthetic rubber have a rated annual capacity of 646,000 long tons of rubber. Disappointments have been encountered in the production of Butyl rubber, and production is negligible until the problems here are solved. GR-S copolymer capacity is still considerably in excess of butadiene capacity, apparently owing to the low priority ratings given the petroleum-butadiene plants, only 39% completed. All neoprene plants have been completed and are producing at rated capacity, and credit is given designers and operators of these plants. Under the manufacturing facilities expansion it was emphasized that it is wiser to expand present facilities than to wait from 12 to 18 months for construction of new plants in other localities, but that expansion of plant facilities alone will not produce the volume of tires and other products needed to support the war. Greater output per manhour on the part of labor, reduction in absenteeism, more efficient flow of materials, better management planning, and improved distribution of manpower are all essential to this program. Labor and management are working together, and it is to be hoped that improved results will come from their cooperative action, the report stated. Not for a year will the fully expanded output of the industry be realized, it was concluded.

Under the "Balance Sheet of Rubber", imports of natural crude rubber for 1943 are estimated at 60,000 long tons. Imports in 1944 are expected to be about one-third greater because of increased shipments from British territory. As of September 30, 1943, the amount of scrap rubber on hand was given as about 754,000 tons, of which 403,000 tons was tires and tire parts. From the tabulation of actual use of crude and synthetic rubbers during the first three quarters of 1943, the estimates for the third quarter of 1943 and the estimates for the year 1944 and the inventory and supply position for 1943 and 1944, some interesting trends can be seen as to the past, present, and future of the rubber situation when these figures are compared with those in Progress Report No. 3. For instance, new supplies of crude and synthetic as estimated in May 1943 as compared with November 1943 were as follows:

	For 1943		For 1944
	May,	Nov.,	
	In Long Tons		
Imports of crude..	54,000	60,000	81,000
Buna S	218,000*	183,635	710,000
Butyl	11,000*	2,292	39,000
Neoprene	29,000*	32,574	49,200
Buna N	17,000*	14,875	20,000
*Crude equivalent total	254,000	233,376+	818,200+
Total all rubbers..	308,000	293,000	899,000
Inventory Jan. 1..	443,000	443,000	205,000
Totals	751,000	736,000	1,104,000
Requirements ..	609,000	531,000	953,000
Balance, Dec. 31..	142,000	205,000	151,000

+ Total synthetic.

It was further stated that at the end of 1944 a large proportion of the stockpile will be in synthetic rubbers, and we will have less crude than the Baruch Committee considered an irreducible minimum. The chart accompanying the report indicates that this will be about 75,000 long tons of crude rubber.

The requirements picture as estimated in May, 1943, and November, 1943, for 1943 and 1944 also is of considerable interest.

	May, 1943 Estimate	Nov., 1943 Estimate	For 1944
Military	286,000	268,400	390,000
Trucks and buses ..	101,000	81,400	145,000
Passenger-size tires.	35,000	42,500	184,000
Other indirect military and civilian uses	36,000	32,100	38,000
Total U. S. A.....	458,000	424,000	757,000
Exports	101,000	73,500	146,000
Exports, Canada only	50,000	33,100	50,000
Grand total	609,000	531,000	953,000

CALENDAR

Dec. 6-11.	Nineteenth Exposition of Chemical Industries. Madison Square Garden, New York, N. Y.
Dec. 7.	Los Angeles Rubber Group. Christmas Theater Party. Pasadena Playhouse, Pasadena, Calif.
Dec. 8-10.	National Association of Manufacturers. Second War Congress. Waldorf-Astoria Hotel, New York, N. Y.
Dec. 10.	American Standards Association. Silver Jubilee and Annual Luncheon Meeting. Hotel Roosevelt, New York, N. Y.
Dec. 15.	Detroit Rubber & Plastics Group, Inc. Detroit Leland Hotel, Detroit, Mich.
Dec. 15.	Rubber and Plastics Division. Montreal Section, S. C. I. Ritz Carlton Hotel, Montreal, P. Q. Canada.
Dec. 16.	Buffalo Rubber Group. Christmas Meeting. Hotel Westbrook, Buffalo, N. Y.
Dec. 17.	New York Rubber Group. Christmas Party. Building Trade Employers Assn. Clubrooms, 2 Park Ave., New York, N. Y.
Dec. 17.	Chicago Rubber Group. Christmas Party. Morrison Hotel, Chicago, Ill.
Jan. 7.	American Section, S.C.I. Perkin Medal Award. Hotel Commodore, New York, N. Y.
Jan. 14.	Rubber and Plastics Division. Montreal Section, S. C. I. McGill University, Montreal, P. Q. Canada.
Apr. 25-27.	**Division of Rubber Chemistry, A. C. S. Spring Meeting. Hotel Commodore, New York, N. Y.**

[1] See pp. 258-63.

The November, 1943, estimate for 1943 is of particular value since it represents actual consumption for nine months of the year and portrays the success in producing synthetic rubber in 1943, the restriction of crude consumption under that estimated in May, 1943, because of the increasing value of every pound of crude in the stockpile, and the necessity of further restricting our exports of both types of rubber during the lean year of 1943. Where the increased synthetic production of 1944 will go may now be predicted with greater accuracy, but may be altered during 1944 by the fortunes of war.

Under a fairly lengthy discussion of conversion to synthetics and the relative performance of products manufactured from synthetic, the summary given under tires is of great importance: *All of the foregoing sums up the conclusion that if synthetic tires are properly used, the treads will give good wear and the tire bodies will stand up so that they can be retreaded. Until more tires are available, however, the careless driver will have to change his habits or stop driving.*[2] It was stated elsewhere in the report that it was not the supply of synthetic rubber that will limit the making of large sizes of tires, but the shortage of manpower, and of high-tenacity rayon cord and the current lack of adequate facilities in the industry, i.e., mills, calenders, etc., and it was reported that the industry is making many of these large tires from the same materials it always has used (natural rubber and cotton) and will do so until more rayon is available. To bridge the crisis in domestic transportation which this situation implies and to keep their industry in operation, the truck and bus industry must cooperate as never before. The 30,000,000 synthetic rubber tires of passenger-car sizes planned for 1944 will only be adequate if the car owners redouble their efforts at conservation of their present tires.

Some further details were revealed of the latest developments of the government-coordinated research and development program on synthetic rubbers in mentioning not only the government-owned pilot plant and evaluation laboratory being constructed in Akron, but also the construction of several small pilot units in the Akron pilot plant and in various rubber, chemical, and petroleum companies, and educational institutions which agree through their own research to further the program.

Some of the processes for the manufacture of synthetic rubbers may not be economically competitive under postwar conditions; while others have every right to hope for a part in the permanent postwar picture, it was said. Postwar amortization and financial charges will be affected by the extent to which abnormal, as well as the normal costs of building the program are written off as "cost of war." Certain combinations of low-cost raw materials probably will give direct cost for Buna S that will be less than 15c per pound. Abandonment of the double-price schedule for both natural and synthetic rubbers which provides a cost far below actual costs for rubbers used in civilian products and the adoption of a uniform higher schedule at about the level charged for government products was advocated.

The latest developments in the synthetic rubber patent field are treated at some length, and it was stated that the Rubber Director is in a position to say to any company willing to assist in the development of better general-purpose rubbers of the Buna type that in return for the contribution of its "know how" and patent developments it can enjoy free rights under the patents of Standard Oil of N. J. and most of the other companies who have been, and will be, working in this field. It is hoped and believed that this background will lead to the development of improved Buna rubbers and to the solution of technical problems not yet wholly solved, the report concluded.

South American Rubber Development Surveyed

A group of newspaper correspondents and a representative of the technical and trade press toured the rubber areas of South America and Haiti under the auspices of the Rubber Development Corp. during October to inspect and report on the progress made during the last 18 months in our efforts to increase the amount of natural rubber that could be obtained from these regions. The general trend of the reports that have been made are not optimistic of the results obtained to date or of the results that can be obtained in the next year or two. It was indicated that in the Amazon region we had two major problems in getting increased quantities of wild rubber: (1) bringing a new supply of labor in the area to tap the trees, and (2) providing transportation to get the tappers up to the high-yielding rubber areas together with the necessary supplies for their use and to bring back the rubber to the coast for shipment to the United States. Agencies were set up in the Amazon for these purposes but instead of leaving it up to the local operators to produce the rubber according to their previously used methods, we attempted a vast colonization and transportation program which has apparently cost large amounts of money, but has increased the amount of rubber we have received from only about 20,000 long tons in 1940 without this new program, to 30,000 long tons in 1943. The cost of this additional 10,000 tons of rubber was estimated as anywhere from $1 to $10 a pound, depending on the estimator, with some figures even much higher suggested. The conclusions of the writers seemed to be that beneficial changes of policy have been taking place, but that much greater changes need to be made if we are to obtain the maximum amount of wild rubber out of this region in the next year or two, when we are most in need of it.

A report on the *Cryptostegia* project in Haiti was also not too favorable. Progress here has been made, and a rapid conversion of some 85,000 acres to the production of this type of quick-yielding rubber is apparently well under way. Many difficult problems have been solved, but the biggest one, that is, how much *Cryptostegia* rubber can actually be shipped during the next year or two, is not at all definite. Officials of the Haitian-American Agricultural Development Society, known as SHADA, state that 3,000 long tons of *Cryptostegia* rubber will be shipped in 1944 and 10,000 to 12,000 tons in 1945, but there are many who believe these figures are too optimistic.

[2] Italics are Rubber Director's.

Reference Fluids SR-6 and SR-10

To meet the need of rigidly standardized gasolines or other immersion media for the testing of synthetic rubber products, reference fluids SR-6 and SR-10, made from materials of definite chemical composition whose degree of purity has been standardized by specifications, are now available for general distribution. They are sufficiently free of volatile fractions so that the original composition is retained under normal storage conditions. As an additional precaution the fluids are inhibited against chemical changes in storage. Reference Fluid SR-6 has been prepared to meet the need of a standard immersion medium which will provide an accurate and constant measure of the swelling effect of highly aromatic aviation gasoline on synthetic rubbers. Reference Fluid SR-10 consists essentially of the non-aromatic constituents of Reference Fluid SR-6 and fills the need of an immersion fluid providing an accurate and constant measure of the "low swelling" or shrinking effect of 65 octane gasoline on synthetic rubbers. In testing synthetic rubbers, these materials give approximately the same volume increase, show the same effect on tensile retention after immersion, and show similar extracts as the averages of the materials they are to replace. The outstanding advantage of these immersion media is that they are made from materials of definite chemical composition and thus assure highly reproducible results. Stanco Distributors, Inc., 26 Broadway, New York, N. Y.

The Erie Engine & Mfg. Co., Erie, Pa., which has become very active in the rubber plant equipment field, is the successor to the Allen and Nagle companies of that city, who have been manufacturers of rubber machinery for the past quarter-century. The company's rubber and plastics machinery line includes heavy-duty mills, refiners, washers, crackers, calenders, hydraulic presses, strainers, and extruders. The present operating staff consists of Works Manager H. E. Crist, General Superintendent James E. Robas, Chief Engineer L. J. Zengel, Personnel Director Richard Roland, Office Manager Willard Greener, Purchasing Agent E. A. LeSuer, and Sales Manager Lloyd Adam.

Rubber Trade Inquiries

The inquiries below are of interest not only in showing the needs of the trade, but because additional information may be furnished by readers. The Editor is glad to have those interested communicate with him.

No.	Inquiry
2894	Supplier of cement to adhere to metal.
2895	Manufacturers of laboratory molding equipment.
2896	Dealers in foam sponge or sponge rubber —scrap, reject, or otherwise.
2897	Catalogues and quotations for certain rubber machinery, molds, spreading tables, calenders, etc.

Rubber Goods Prices and Rationing Revised

RSR 14 to GMPR, Amendment 51—Servicing of Raw Rubber—effective November 22, sets ceilings that may be charged for servicing raw rubber; these are given in cents per pound for plantation, guayule, and wild rubbers; synthetic rubbers; and balata. The services consist of such operations as weighing, sampling, testing, and financing rubber bought by rubber manufactories.

As the ORD has ordered production of certain druggists' sundries from synthetic rubber instead of crude and manufacturers are thus using Buna S to make hot water bottles, combination and fountain syringes, ice caps and bags, and invalid rings and cushions, OPA by Amendment 12 to MPR 300—Maximum Manufacturers' Prices for Rubber Drug Sundries—effective November 6, set ceilings for the war model (Victory Line) items made from Buna S or Butyl and for certain types of sundries now permitted to be made of synthetic rubber which for some months had not been manufactured because of crude rubber restrictions. In both cases temporary changes in specifications are provided because of the industry's insufficient experience with the synthetics to provide all necessary data. Modification and extension of the requirements, therefore, may be expected later. Synthetic rubber sundries comparable to pre-war production, but not included in the Victory Line, are given the same ceilings as those for the comparable prewar product of natural rubber, with December 1, 1941, which is the base level.

To be entitled to ceilings of Amendment 12 the synthetic rubber items must be made to the same minimum wall thickness or gage and in the same mold or to the same minimum dimensions as the natural crude rubber goods produced on December 1, 1941, or on the nearest date before then. If molded hot water bottles or syringes in this classification are to be made in molds reported to OPA as for use on Consumer Grades I or II of the Victory Line, written approval for such production must first be secured from the OPA at Washington. The amendment, furthermore, decrees that Buna S or Butyl molded hot water bottles, fountain syringes, and combination syringes, Consumer Grades I and II, be priced as Victory Line rubber druggists' sundries even though they do not meet all the ordinary specifications for Victory Line items of natural rubber.

Amendment 15, MPR 149—Mechanical Rubber Goods—effective November 9, contains specific ceilings for certain hose and belting to replace individual maximum prices that had to be determined separately by each manufacturer. Thus provided are more effective control of prices and a more easily applied method of determining ceilings. As the amendment does not change the level of prices, it has no effect on consumers. Among the commodities affected are Grade 1 neoprene elevator, transmission, and conveyer belting, winterized wire braid Buna N high-pressure hydraulic control hose, and air and air tool hose Grade 1 (molded-braided type).

A new supply of children's non-leather shoes for general wear will be available ration-free about the first of the year. Amendment 42 to RO 17—Shoes—effective November 8. Any such shoes larger than misses' and youths' size three will be rationed. OPA is limiting ration-free sales to small sizes to encourage production in the pre-school and early school age ranges where the most serious shortage is now being felt. Although the shoes will have canvas uppers, OPA pointed out that they will not be ordinary gym and tennis types. The soles will be made from remnants and other available materials, principally heavy woven fabric, reenforced with vulcanized rubber. The shoes will be suitable for general wear. This change in the shoe ration order has been made possible by the cooperation of the WPB and the Office of the Rubber Director.

OPA also provided for the ration-free sale of the small available stocks of gym and tennis shoes with rubber soles and canvas uppers. Since the production of rubber-soled gym shoes for civilian use has been prohibited by WPB since March 1942, very few are on the market. However small lots, rejected by the Navy because of minor defects, have been made available to civilians. Some gym shoes are also being made for civilian army trainees. OPA now permits the sale of any such gym and tennis shoes ration-free. Dealers who have any athletic shoes in stock which are released under this provision may get replacement ration currency for them from their OPA District Offices.

Under Amendment 4 to RO 6A—Men's Rubber Boots and Rubber Work Shoes—effective November 20, a worker whose dealer is unable to fill his order for rationed rubber footwear before his purchase certificate expires may leave the certificate with the dealer and get the footwear at a later date. Further to simplify the rubber footwear rationing system, workers no longer need endorse rubber footwear certificates before using them, but members of the trade must continue to do so, and manufacturers must now write the date of receipt on each certificate before sending it to the OPA Inventory Unit, to indicate its use before expiration date.

Order 620 under 1499.3 (b), GMPR, effective October 21, covers ceilings for the sale of hosiery yarns made by United States Rubber Co., 1230 Sixth Ave., New York, N. Y.

Amendment 11, RMPR 183—Textiles in Puerto Rico—effective November 22, includes in its listings of maximum prices for imported textile products sold or delivered in Puerto Rico dress arm shields, elastic, garters, shower curtains, and suspenders.

Amendment 18 to MPR 373—Maximum Prices in the Territory of Hawaii—issued October 15, covers, among other commodities, retreaded and recapped tires, used tires and tubes, women's and girls' rainwear, foundation garments, and brassieres. Under Amendment 19, issued October 19, will be found such items as athletic supporters, men's and boys' rainwear, garters, belts, and suspenders.

Members of the Coated and Combined Fabrics Industry Advisory Committee met with OPA representatives at the Hotel Roosevelt, New York, November 4, to discuss the operation of MPR 478, which went into effect November 1 and covers manufacturers' and wholesalers' maximum prices for coated and combined fabrics, and the coating and combining of fabrics, which formerly were covered under several other regulations. The first meeting of the Coated and Combined Fabrics Industry Advisory Committee was held October 21 in Washington. Besides discussing the coverage, reporting requirements, and other features of the regulation, the committee organized and elected officers. The OPA also called general meetings of the industry in New York on October 25, Boston on October 26, and Cleveland on October 28, at which the regulation and its intended operation were explained in anticipation of the November 1 effective date. The New York meeting November 4 took cognizance of criticism and suggestions from the industry.

Members of the Industry Advisory Committee with whom it was held, are: E. S. Nickerson, E. I. du Pont de Nemours & Co., Inc., New York, committee chairman; E. A. Clare, Athol Mfg. Co., Athol, Mass., committee vice chairman; A. W. Hawkins, The Brunsene Co., East Cambridge, Mass., secretary-treasurer of the committee; G. A. Lovell, Coated Fabrics Division, United States Rubber Co., Mishawaka, Ind.; M. I. Woythaler, Hodgman Rubber Co., Framingham, Mass.; C. V. Austin, The Holliston Mills, Norwood, Mass.; W. F. Regnery, Western Shade Cloth Co., Chicago, Ill.; H. E. Nesbitt, Columbus Coated Fabrics Co., Columbus, O.; J. G. Grower, Haartz-Mason-Grower Co., Watertown, Mass.; J. D. Lippman, Textileather Corp., Toledo, O.; L. E. Carpenter, L. E. Carpenter & Co., Newark, N. J.; E. E. Bushnell, C. W. Breneman Co., Cincinnati, O.; R. Sherman, Taunton Coating Mills, Inc., Taunton, Mass.; and R. S. Robe, Electro-Technical Products Co., Nutley, N. J.

Rev. SR 14 to GMPR, Amendment 43, effective November 1, adds ceilings for furfural to the provisions of the order.

Tire and Tube Changes

To remove any possible threat to production and distribution during the consideration of a requested increase in ceilings of new rubber tires and tubes sold by manufacturers to brand owners, OPA by Order No. 5 to MPR 143,—Wholesale Prices for New Rubber Tires and Tubes—effective November 12, authorized such sales to be made at prices to be adjusted later in accordance with OPA action. An increased maximum price for the new tires and tubes, when sold to brand owners, was requested by some manufacturers. In announcing Order 5, OPA said that whatever decision is made probably will not affect prices to consumers. If any narrowing of the margin for brand owners is caused by the new manufacturers' maximum prices for the new rubber tires and tubes, it will not be so great that brand owners will be unable to absorb the difference, at least for a time. Brand owners, furthermore, have indicated their willingness to accept a narrower margin for themselves while the situation is being worked out so that they may be more certain of

obtaining supplies of tires and tubes for distribution.

Amendment 8, MPR 143, effective November 15, offers a method for sellers of private brands of new tires and tubes whereby they may apply for adjustment of their wholesale ceilings when the cost of the products to them is so high that it wipes out their operating margin. The method applies to any private brand owner, except manufacturers, whose total wholesale maximum price is under his supplier's ceiling for the tires and tubes, plus his own actual warehousing and transportation costs. Need of this new arrangement arose because some tire and tube manufacturers who had been selling below their legal maximum prices now sell at the ceiling prices; which action caught some private brand owners in a "squeeze" since their ceilings were set at March, 1942, levels, when their operating margin was adequate because of the lower prices of the tires and tubes they bought.

Maximum prices for recapping passenger-car tires with Grade A camelback appear in Amendment 7 to RPS 66, as Amended—Retreaded and Recapped Rubber Tires and the Retreading and Recapping of Rubber Tires—effective November 23; this grade of camelback is now available for use on passenger-car tires when used by taxis and "jitneys." The amendment also establishes a ceiling for recapping 13.00-24 (12.75-24) eight-ply tire with rock-service tread, and also corrects a typographical error in the column of ceiling prices for the road-grader type of tread, in Table II A.

Amendment 2, MPR 435—New Bicycle Tires and Tubes—effective November 20, makes several changes in the regulation. Specific ceilings for "factory second" new bicycle tires and tubes are provided, and maximum prices established for the first time for a variety of single-tube bicycle tire sizes which were made before the rubber shortage led to simplification of production lines, but which now are being made again as replacements on old and odd-size bicycles, wheelchairs, and for similar out-of-the-ordinary demand. Also given is a specific ceiling for one size of tube formerly priced by one company under a formula, but recently put on the market by another company unable to apply a formula price. The amendment, furthermore, makes price readjustments for several sizes of brands of Simplex Mfg. Co., New Orleans, La., and Atlas Supply Co., Newark, N. J.

Amendment 3 to MPR 415—Certain Federal Government Purchases of New Rubber Tires and Tubes—and Amendment 6 to MPR 119—Original Equipment Tires and Tubes—change the effective dates of the orders from November 1 to December 1, 1943.

RO 1A—Tires, Tubes, Recapping, and Camelback—recently underwent further changes as follows. Amendment 58, effective November 1, to help keep in operation the 340,000 commercial vehicles delivering medical supplies, drugs, laundry, dry cleaning (apparel only), and essential foods to homes makes these vehicles eligible for used passenger tires and used truck tires of sizes smaller than 7.50-20 to replace tires no longer serviceable. Previously such vehicles had been ineligible for any tires, but the Office of Defense Transportation requested the change in status. This action, however, imposes an added strain on the already scarce supply of used tires and thus will heavily cut into the amount available for passenger cars. OPA estimated that a minimum of about 550,000 used tires, mainly of the passenger type, will be required during the next 12 months to keep the aforementioned commercial vehicles operating on a restricted basis.

Under Amendment 59 (November 11) dealers who acquired new tires or tubes without ration certificates under a plan announced last May for getting stocks down to the dealer level as quickly as possible may retain the ration currency received from the sale of these tires and tubes in order to avoid disruption of tire and tube distribution. Many dealers who obtained stocks under the plan would be compelled to operate with stocks too small for proper servicing of consumer demand if the original provision calling for surrender of the ration certificates were carried out.

November tire and tube quotas reflect the shortage of new passenger and truck tires, and, as compared with October, there were available for rationing 3% fewer new tires for trucks and 14% less new tires for passenger cars. At the same time, OPA increased by 28% the quota of used or recapped passenger-car tires (Grade III). Representing the only increase in the November quotas for tires and tubes, this action was designed to accommodate the anticipated greater demand for used tires resulting from the scarcity of new ones. The November quotas were based on allotments assigned by the Office of the Rubber Director.

The gravity of the truck tire supply situation was reflected in a memorandum in which OPA informed its rationing organization that "the nation is confronted with a serious truck tire shortage, and the local boards will have to use all of their ingenuity to avert a serious mass transportation breakdown." It was pointed out further that acceptance of recapping service certificates is a necessary conservation measure. Regional and district offices were directed to "hold on to their meager reserves of new truck tires and new passenger tires to meet those situations where eligibles are actually off the road because of a lack of tires."

Forecasting that the December quotas on new passenger and truck tires will remain at approximately the November level, OPA stated that the country faces a shortage of new tires until synthetic tires can be produced in adequate quantity to replace the dwindling supply of present tire stocks.

The total tire quotas for November as compared with those for October follow:

November		October
	Passenger & Motorcycle	
553,088	Grade I	645,050
829,650	Grade III	648,800
645,494	New Tubes	652,374
	Truck & Bus	
290,245	New Tires	416,613
297,642	New Tubes	361,660
	Farm Tractor & Implement Tires	
46,000		59,800

Amendment 1 to RO 1D—Tires, Tubes, Recapping, and Camelback in Canal Zone—covers jurisdiction of the rationing board over vehicles normally stationed or garaged within the Zone.

Amendment 2, RO 1B—Mileage Rationing, Tire Regulations for Puerto Rico—effective October 18, treats of spare tires, recapping, replaced tires and tubes to be turned in, transfers on vehicles, and turn in of tires or tubes to be replaced.

Amendment 2, RO 1E—Mileage Rationing Tire Regulations for the Territory of Hawaii—effective November 5, covers eligibility for tires and tubes determined on basis of adjusted basis, and recapping; while Amendment 3, effective November 15, relates to definitions of camelback, and recapping.

RO 1F, effective October 29, constitutes the tire rationing regulations for the Territory of Alaska.

Textile Research Institute, Washington, D. C., has formulated large-scale plans for research on textiles involving: covering all branches of the textile industry, and all fibers; location of laboratories near New York; development of a program covering fundamental research, applied research, a graduate school in affiliation with a leading university, economic research, information service, etc.; and raising a research fund of $300,000 a year for five years or $1,500,000 plus a capital fund of $500,000.

United States Coast Guard on November 17 in its amendments to regulations and approval of equipment (Part 153—Boats, Rafts, and Lifesaving Appliances: Regulations during Emergency) approves, among other goods, a neoprene lifesaving suit, Model No. 6 (Coast Guard Specifications dated September 1, 1943), submitted by The B. F. Goodrich, Akron, O.

National Association of Independent Tire Dealers, Washington, D. C., calculated November production of camelback about three million pounds above that of any previous month, and the December figure five million pounds above that of November, putting camelback production about 30% higher than it has been at any other time.

Leo T. Crowley, Foreign Economic Administrator, Washington, D. C., in the interests of greater efficiency on October 26 consolidated into one unit, known as the Foreign Economic Administration, the following: Lend-Lease Administration, Office of Economic Warfare, Office of Foreign Relief & Rehabilitation, the foreign procurement division of Commodity Credit Corp., and "such parts of the Office of Foreign Economic Coordination of the State Department as may be transferred from the State Department."

Mr. Crowley, in Order No. 16, November 22, requires all persons claiming any interest in trade marks, commercial prints or labels now or formerly owned by nationals of designated foreign countries to report their interest, including any agreement or claims of ownership, on Form APC-31 by February 1, 1944. The form and instructions for reporting are obtainable from the Office of Alien Property Custodian in Washington, New York, Chicago, and San Francisco. But completed and sworn reports must be returned to the APC in Washington.

Some Rubber Restrictions Revised by WPB

All restrictions on the use of elastic fabric in girdles, corsets, combinations, sanitary and garter belts, and brassieres were lifted October 28 by the WPB. Following closely on its recent action permitting manufacture of elastic thread and fabric from synthetic rubber, the new move simply completes the pattern for production of elastic-type garments made possible by the increasing supplies of synthetic. The only restriction still in effect limits quarterly output of corsets, combinations, and girdles to 75% of 1941 first-quarter production.

Officials again cautioned against any undue optimism as to the quantities of elastic-type garments to be made immediately available to consumers. Considerable experimentation and testing remain to be done before large-scale output of elastic-type garments can be attained, they said. Likewise it will take time for the production cycle—from fabrication of the elastic thread to completion of the end-product—to get into full operation. Once present experimentation with synthetic has been completed, it is expected that all-elastic garments will again appear on the retail market. This will include the so-called "two-way stretch" garments. At best, it was felt, no all-rubber garments will be on the market until the early part of 1944; and it will be some time after that before full-scale production will be possible.

In effect, this revocation of Order L-137—Sanitary Belts and Supports—and amendments of L-190—Corsets, Combinations, Etc.—removes all restrictions on the amount of elastic fabric to be used in an individual garment. Since December, 1941, strict limitations on the quantitative use of the fabric have been in force to spread as thinly as possible the inventories of elastic fabrics on hand at that time. Those inventories have for the most part now been entirely consumed.

Order L-90-a, limiting production of corsets, combinations, and brassieres, was revoked October 30. The action was routine since provisions of the order have been incorporated in L-90, which now governs production in the corset industry.

The recently appointed Corset & Brassiere Industry Advisory Committee consists of: G. R. MacDonald, government presiding officer; E. S. Axline, H. W. Gossard Co., Chicago, Ill.; D. L. Jones, Strouse Adler Co., New Haven, Conn.; W. E. Barnes, Mabs of Hollywood, Los Angeles, Calif.; M. Kops, Jr., Kops Bros., Inc.; H. Berstein, Milady Brassiere & Corset Co., H. P. Kurzman, Lily of France Corset Co., F. Cohen, Sulvia Brassiere Co., and M. Mayer, Vanity Corset Co., all of New York, N. Y.; R. L. Donnelly, S. Stein & Co., Chicago; M. Ladenheim, Divineform Brassiere Co., Inc., New York; J. T. Hart, Kabo Corset Co., Chicago; R. Miller, Helene of Hollywood, Glendale, Calif.; W. Hosler, Spirella Corset Co., Niagara Falls, N. Y.; R. H. Robbins, Foirette Corsets, Inc., and W. Rosenthal, Maiden Form Brassiere Co., Inc., both of New York; L. T. Warner, Warner Bros. Co., Bridgeport, Conn.; G. Rutledge, Vassar Co., Chicago, and W. Weinstein, Rite Form Corset Co., Inc., New York.

The Office of the Rubber Director on November 9 advised all manufacturers of sporting goods that effective November 10 they are authorized to consume general-purpose synthetic rubber, reclaimed, and scrap rubber for the manufacture of the following: tennis, squash, hand and lacrosse balls, baseball centers, ice hockey pucks, boxers' teeth protectors, home plates and pitchers plates, recoil gun pads, cleats for athletic shoes, and bladders, covers, coated fabrics, impregnated yarns, and valves for the following: basketballs, footballs, soccer balls, volley balls, punching bags, water polo balls, baseballs, and soft, cage and push balls.

The issuance of this authorization is predicated upon the manufacturer's assurance that the production of these items will not in any way prejudice or interfere with the production and delivery of products heretofore permitted for government or essential civilian use. The provisions of Order R-1 are waived to the extent required to effect the exceptions authorized above provided that all other provisions of R-1 are complied with in full.

General Limitation Order L-*227*-b as Amended October 30, 1943—Wood Cased and other Non-Mechanical Pencils and Pen Holders—added to the restricted list wood cased or similar pencils. Crude, reclaimed, or synthetic rubber may not be used in their manufacture except as permitted in Rubber Order R-1, as amended, or any relief granted pursuant to an appeal taken in accordance with the provisions of R-1.

Additional restrictions against selling farm equipment for non-farm use except on a rated order of AA-4 or higher were made in L-*257*, as amended November 15, 1943—Farm Machinery and Equipment and Attachments and Repair Parts Therefor. New provisions of the order prevent dealers from selling rationed farm equipment from stock, except in specified cases, such as Army and Navy orders, in order to prevent diversion of scarce equipment designed for farmers. Restrictions of rubber tires are removed from L-*257* so that all provisions on tires may be controlled by R-1. Some other technical changes in language are made.

Other WPB News

The WPB has announced that a nation-wide consumer survey began November 7 by the Bureau of the Census for the Office of Civilian Requirements, whereby 7,000 households are being visited and asked about the availability of 115 types of goods and services used in homes and on farms. Thus, OCR will have factual information from consumers for use in carrying out its function of maintaining an adequate supply of necessary civilian goods and services within the limit set by the war demand for manpower, manufacturing facilities and materials. Among the products about which information is being sought are: brassieres, girdles, babies' waterproof pants, elastic tape or webbing, iron cord, automobile tires and inner tubes, tire recapping, and tube repair.

All scheduled production programs covering high-tenacity rayon yarn for rubber tires were completed November 15 with a WPB directive to the North American Rayon Corp. ordering a 5,000,000-pound expansion to its annual capacity, to bring the total scheduled output of the "high-tenacity tire-cord-type rayon yarn" to 240,000,000 pounds. Owing to time required for constructing needed facilities, however, actual annual production of the yarn is not expected to reach this level until 1945. The expanded 5,000,000-pound annual production capacity will be installed at North American's Elizabethton, Tenn., plant and is in addition to an 8,200,000-pound capacity previously assigned to the corporation. It is expected that part of the 5,000,000 increase will have to be met through expansion of present facilities at the plant, but this must be completed by August 1, 1944.

At the same time WPB directed the American Viscose Corp. to increase by 11,000,000 pounds its present annual capacity for twisting and weaving tire cord fabric from high-tenacity rayon yarn produced by its plants, making its total annual tire fabric production schedule 39,000,000 pounds annually. This action was taken after it was found that the company has available floor space for installation of twisting and weaving facilities at both its Parkersburg, W. Va., and Lewiston, Pa., plants.

Last month was formed the Rayon High-Tenacity Tire-Type Yarn Producers Industry Advisory Committee consisting of: Harry L. Dalton, government presiding officer; J. L. Bitter, North American Rayon Corp., Elizabethtown, Tenn.; Frank Griffin, American Viscose Corp., Wilmington, Del.; Hayden Kline, Industrial Rayon Corp., Cleveland, O.; J. L. Moritz, American Enka Corp., Ashville, N. C.; H. J. White, E. I. duPont de Nemours & Co., Inc., Wilmington. The first meeting of the committee was held November 10.

Order M-103, as amended October 23, increases, because of declining military requirements, by 16⅔% the amount of organic dyestuffs and organic pigments to be used for civilian purposes. Among other changes in the amended order is one excepting from M-103 dyestuffs used for other than coloring purposes, such as, for example, rubber chemicals.

War Food Administration, Washington, D. C., on November 1 issued Amendment 1 to FDO 60—Fish Oil—which covers restrictions on the delivery, use, consumption, and processing of fish oil. Among the specific exceptions to the order is the use of fish oil, other than Alaska herring oil or Alaska seal oil, as a rubber compounding ingredient in the manufacture of natural or synthetic rubber products.

Charles Everett, of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., recently was elected to the board of governors of the Rayon Yarns Credit Association.

Petroleum Administration for War, Washington, D. C., through PAO 18, bans the use of naphtha in the operation of motor boats and vehicles in order to prevent a shortage of that petroleum product in certain areas.

EASTERN AND SOUTHERN

Kelly-Springfield Expanding

Following its reconversion from the manufacture of small arms ammunition to tires, The Kelly-Springfield Tire Co., Cumberland, Md., one of the few plants totally converted to other types of production and now back to its original products, has embarked upon an expansion program to meet the pressing demand for tires. Late last month the plant began making synthetic rubber tires, but output will be relatively low until certain badly needed new machinery and equipment are received and installed. Shortly after January 1, however, the company expects to hit a fairly high rate of production on passenger-car tires. Present plans, moreover, call for steadily increasing output of synthetic rubber truck tires during the first part of '44, and the firm hopes to get close to full stride production-wise the the early part of the second quarter. The company started production of camelback November 1 and is turning out this material at well over twice its prewar rate.

Kelly-Springfield's original main plant consists of one large header building, about 120 by 800 feet, from which branch five wings, about 400 by 60 feet. To secure the necessary additional floor space the firm is covering over the open spaces between these wings and removing part of the side walls. When the task is done, the firm will thus have one big main building about 800 by 520 feet, which will provide adequate space for, and allow for an uninterrupted flow of material through, nearly all main production operations. The job of filling in foundations and floors between the wings should be completed by the year-end. Several million dollars worth of new machinery and equipment are now on order, which, when installed, will enable Kelly-Springfield to produce at very nearly double its prewar rate.

The firm has called back approximately 500 former tire builders, keeping as well those who had transferred to the ammunition work. When full production is reached, about 2,500 employes are anticipated. Since tire building necessitates relatively heavy kinds of work, men are required in most of the operations although, of course, women will be given opportunities wherever their strength and ability permit. But it is estimated that not more than 10% of the tire factory workers will be women.

The Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., manufacturers of industrial rubber goods, Passaic, N. J., on October 28 observed its fiftieth anniversary.

Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., has made Robert Collyer advertising manager, with supervision over the advertising and promotion activities of the division. Before joining Calco, Mr. Collyer was active in direct mail advertising and in the printing trade of New York.

Wild Guayule in Texas

A scattered stand of wild guayule, growing in the rough "Big Bend" country of southwestern Texas, will add a small supply of natural crude rubber to the nation's dwindling stockpile as the result of a harvesting project conducted by the Forest Service in cooperation with the Rubber Reserve Co., the United States Department of Agriculture recently announced. The amount of rubber expected is only a minute fraction of the country's requirements, but is very important in view of the need of natural rubber to blend with synthetic rubbers.

Over a period of several years a guayule mill at Marathon, Tex., processed all the shrub considered accessible, then closed in 1926. The critical shortage of natural rubber led the government to survey remnants overlooked by the former operators, and second growth stands. Between 1,500 and 2,000 tons of shrub suitable for harvesting have been found. A contract has been let for collection of the shrub, and provisions have been made in the harvesting plans to leave sufficient guayule to insure future production.

Shipment already has started to Salinas, Calif., where the shrub will be processed in a reconditioned factory operated by the Department's Emergency Rubber Project. Some 880,000 pounds of rubber were recently milled from nearby cultivated guayule fields at Salinas.

Rubber extraction processes have been improved since the days of the Marathon mill, officials of the Forest Service say, and methods of collecting the shrub are much more efficient. These factors are expected to help offset the extra cost of harvesting the sparse stands in rugged country. Where the usual practice had been to pack the shrubs out on burros and bale it in crude hand presses, the foresters are using tractors and trailers to do the collecting and power balers to prepare it for shipment. Such practices have reduced labor needs. Camps have been pitched on the range.

The plants are pulled out of the ground since branches and roots alike yield rubber. In extracting rubber the entire plant is ground up in water. The rubber separates from the plant fibers and floats to the surface in particles. Cultivated strains of the plant produce as much as 20% of their dry weight in rubber, it is reported, but yield from the wild shrub is somewhat lower.

Guayule has been cultivated experimentally in a limited manner in the United States for the past 30 years and has been much improved as to rubber content. Under cultivation, the shrub may be harvested in two or three years when grown on irrigated land; or four or five years on dry farm land. The average age of the wild shrub now being harvested is believed to be about 14 years.

Wild guayule also grows, and in better stands, in parts of North Central Mexico, where it has supported a stable rubber industry for 40 years.

Neches Butane Products Co., Port Neches, Tex., expects to put into operation this month two units of its plant, which, it is said, will be, when completed early in 1944, the largest plant in the world producing butadiene from petroleum. The plant's output will be enough butadiene to produce one-seventh of the entire wartime program of synthetic rubber in the United States. The project, sponsored by Atlantic Refining Co., Gulf Oil Corp., Pure Oil Co., Socony-Vacuum Oil Co., Inc., and Texas Co., had its inception on January 12, 1942, when Herbert Henderson, Gulf Oil vice president, was summoned to Washington for a discussion of the needs of the synthetic rubber industry. He suggested that a plant of 100,000 tons rated capacity be built in the heart of the Texas Gulf Coast oil region and that it be supplied with feed stocks by nearby refineries of the five oil companies. These upon consultation not only agreed to supervise construction and operation of the plant without profit, but to furnish the government the services of management advisory, technical, and legal committee members and to pay their expenses. As a result the Neches Butane Products Co. was organized to supervise design of the plant and manage its operation for the government. While it required nearly 6,000 workers to build the plant, only about 700 will be needed to operate it. It will be run with three eight-hour shifts daily, every day in the year.

Thermoid Co., Trenton, N. J., has appointed Clarence B. Moore head of the rubber division of Thermoid research laboratories, and Harry Bourne methods engineer in charge of hose production for the rubber division. Joseph Harrison, Thermoid's chief rubber chemist, will continue in his post as will the rest of the rubber research staff. Mr. Moore was formerly with Goodyear Tire & Rubber Co. for six years in industrial rubber products and with The B. F. Goodrich Co. for about 15 years. While with Goodrich, he served as group head of the technical division for industrial rubber products and later in technical sales and service with Goodrich's Philadelphia rubber division. Mr. Bourne has been in the rubber industry for more than a quarter-century, including connections with Boston Woven Hose & Rubber Co., several years as plant manager of Electric Hose & Rubber Co., production manager of hose with Goodrich, and others. These additions to Thermoid's organization are in line with the company's progressive program to meet the problems of changing current conditions and to develop an active conversion ability for postwar operations, particularly regarding earliest possible anticipation of model changes in the automotive industry.

American Viscose Corp., 350 Fifth Ave., New York, N. Y., reports that many fliers' lives have been saved in this war because their planes were equipped with self-sealing or bullet-sealing gasoline tanks made of rayon fabric coated with rubber. Rayon is used for this purpose primarily because it provides the required strength and tear or bursting resistance together with the light weight needed for use in fighting planes.

Changes at U. S. Rubber

R. E. Casey, general sales manager of Naugatuck Chemical Division, United States Rubber Co., 1230 Sixth Ave., New York, N. Y., last month announced several personnel changes in the division.

Harold I. Beadle has been appointed sales manager for new products and will handle sales of new synthetic rubbers and synthetic plastics and also new developments in other chemical fields being explored by the company. Besides Mr. Beadle has been put on the new products committee responsible for the investigation and evaluation of new products. He was graduated from Massachusetts Institute of Technology in 1923 with a degree in chemical engineering and practiced as a consulting engineer in New York for six years. Then he was employed by Tide Water Associated Oil Co. from 1929 to 1940 and next joined Commercial Investment Trust.

Arthur Nolan has been appointed sales manager for Lotol, Latex, and Dispersions Process, Inc.; while Raymond E. Nelson, formerly assistant sales manager for these products, has assumed the duties of sales specialist, concentrating his attention on new outlets.

Paul Mahoney, formerly of the general development division, has been transferred to the sales force, specializing on temporary protective coatings; and Albert W. Holmberg, formerly of the Naugatuck development department, comes to the sales department as technical representative. H. W. Maucher, who joined the sales department November 1, will represent the department at the Naugatuck chemical plant.

Howard G. Ling has been added to the rubber chemicals sales force, with headquarters in New York.

Oliver E. Goddard has been appointed sales analyst, reporting to the general sales manager.

A. G. Richtmyer has been made manager, sales analysis department, Fisk tire division, it was announced last month by J. C. Ray, Fisk tire sales manager. A graduate of Harvard University (1928), Mr. Richtmyer joined U. S. Rubber in 1936. In 1941 he obtained a leave of absence to become head of the research division of the OPA tire rationing board in Washington, returning to the company after two years with the OPA and the WPB.

Harold J. MacDonald and Howard F. Johnson, of the wire and cable department of U. S. Rubber, were assigned new positions, it was announced November 29 by C. W. Higbee, manager of the department. Mr. MacDonald's first post with the company was at the Bristol plant in 1920. He was promoted to New England sales manager with offices in Boston in 1921 and in 1938 to eastern district sales manager of the wire and cable department. His new appointment places him in charge of all jobbing with the title of manager, jobbing sales.

Mr. Johnson also started at the Bristol plant, in 1922, was promoted in 1932 to office manager, wire and cable department, and in 1936 to western district sales manager. His new post is manager of branch sales, with offices at company headquarters.

W. A. Gibbons, director of general development, F. B. Davis, chairman of the board, and Herbert Smith, president of U. S. Rubber, on November 17 at a meeting of the Carolina Piedmont Section, A. C. S., at Charlotte, N. C., discussed synthetic rubber in off-the-record talks.

Cyrus S. Ching, director of industrial and public relations for the rubber company, on November 1 was elected a director of the Cramp Shipbuilding Co. in a move intended to lessen labor problems at the plant. Mr. Ching, incidentally, was married on November 10 to Miss A. M. Vergosen, his secretary at U. S. Rubber.

General Laboratories of U. S. Rubber has developed Vibeston, a sound-deadening material recommended for use on airplanes. Made of asbestos and other non-strategic materials, it serves both to deaden sound and dampen vibration.

Reconverts to Tire Cord

With the pressing need of more tire cord U. S. Rubber has converted two more textile mills from the manufacture of duck to tire cord production, according to H. Gordon Smith, general manager of the textile division. These mills, located at New Bedford, Mass., and Shelbyville, Tenn., make a total of four mills operated by the company, including one at Hogansville, Ga., and another at Winnsboro, S. C., now devoted to tire cord production. This move is in line with the government's program for more rayon and cotton tire cord for both military and essential civilian transportation requirements.

The New Bedford mill had been producing some numbered duck for gas mask carriers, jungle boots, leggings, bed rolls, tents, and other war items for the Army Quartermaster Corps. This production has now been diverted to making tire cord.

Chafer fabric will continue to be made at Shelbyville to the extent of about 25% of the plant's capacity. The other 75% involving the manufacture of numbered duck has been converted to tire cord production.

U. S. Rubber's Reid mill at Hogansville, will continue on hose and belt duck for war orders.

Lawrence A. Wood

Rubber Section Chief

The new chief of the Rubber Section, National Bureau of Standards, Washington, D. C., is Lawrence A. Wood, A.B., Ph.D. He came to the Bureau in 1935 as a research physicist, and so satisfactory has been his work that when Dr. McPherson this summer was promoted from chief of the Rubber Section to chief of the Division of Organic and Fibrous Materials at the Bureau, Dr. Wood was the logical candidate for the vacated post. He is widely recognized as an authority on the physical constants and properties of both natural and synthetic rubber, and he is also the author of numerous scientific papers dealing with the optical and thermodynamic properties of rubber, and the crystallization of rubber, as well as related subjects.

Dr. Wood was born in Peekskill, N. Y., on January 15, 1904. He was graduated from Hamilton College in 1925 and received his doctorate from Cornell University in 1932. During 1927-28 he was an assistant in physics at Cornell and spent the years 1928-35 as an instructor in physics there. Then he joined the Bureau of Standards. In 1938, Dr. Wood was appointed by the State Department one of two official delegates to represent the United States at the World Rubber Technology Conference which was held that year in London, England.

He belongs to Phi Beta Kappa, Sigma Xi, Phi Kappa Phi, Gamma Alpha, the American Physical Society, the American Chemical Society, the Philosophical Society of Washington, and the Washington Academy of Science. He finds his relaxation in tennis and genealogy.

Dr. Wood maintains bachelor quarters at 3731 Kanawha St., N. W., Washington 15, D. C.

The Baldwin Locomotive Works, Baldwin Southwark division, Philadelphia, Pa., through F. G. Schranz, division vice president, has announced the appointment of John C. Graf as sales manager of the hydraulic press and special equipment department of the division. Mr. Graf was hired by the Southwark Foundry & Machine Co., now the Baldwin Southwark division, in 1915 and served as draftsman, expediter, inspector, purchasing agent, and salesman. In 1925 he was named New England sales manager, a post he held until his recent advancement. Prior to joining Southwark, Mr. Graf had worked for the Camden Iron Works of R. D. Wood & Co., Philadelphia, where his duties included the design of hydraulic machinery and gas producers and the installation and testing of gas producing plants.

Columbia Chemical Division of the Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh, Pa., has completed, at Natrium, W. Va., the largest chlorine plant ever built as a single unit east of the Mississippi River. Columbia Chemical is operating the plant, which was financed by Defense Plant Corp.

OHIO

Tire Making Facilities Enlarged

With the award of contracts for construction of a 256,000-square-foot addition to the Gadsden, Ala., plant November 11, P. W. Litchfield, chairman of the board, Goodyear Tire & Rubber Co., Akron, announced that the company's thirty-million-dollar tire expansion program is now fully under way.

"Parts of this program are already completed," Mr. Litchfield stated. "That which remains will be completed with all possible speed so that Goodyear may carry its full share of the job of processing the country's mounting supply of synthetic rubber."

Plant additions have been held to a minimum in the Goodyear program, Mr. Litchfield declared. The bulk of the program is devoted to new and modern tire and processing equipment which is being or will be installed in existing buildings. Needed additions at the Gadsden and Jackson, Mich., tire plants and the Decatur, Ala., fabric plant were the major exceptions to this rule.

One tire plant which had been converted to the manufacture of three-inch cannon and another tire plant which had been converted to the production of fifty-calibre machine gun bullets are now being reconverted to tire production.

The production of much non-tire military equipment is being moved to sub-contractors and newly leased space in several parts of the country to make room for the return of tire production at the Akron and Los Angeles, Calif., plants.

Heavy emphasis is placed upon additional rubber milling equipment in the Goodyear expansion program. Mr. Litchfield explained this by pointing out that synthetic rubber is more difficult to mill than natural crude rubber and requires about 20% more machine capacity to obtain an equivalent tonnage of milled stock.

Synthetic Rubber Plant Opens near Houston

Accompanied by Goodyear dealers from Texas, Louisiana, and Arkansas, several hundred business and civic leaders from Houston, Tex., toured Goodyear's new synthetic rubber plant near Houston on November 17 to inaugurate its formal opening. Each visitor was given a slab of synthetic rubber and a small vial of crumb rubber. Another feature of the affair was an extensive exhibit of synthetic rubber products including tires, footwear, oil- and gasoline-resistant sealing rings and gaskets, airplane hydraulic system accumulators, railway brake seals, etc.

In the evening the Goodyear dealers attended a dinner at which Goodyear Vice President R. S. Wilson was the principal speaker. He discussed the present serious tire situation. Other speakers were J. Gordon Turnbull, president of J. Gordon Turnbull, Inc., consulting engineer of Cleveland, who designed all of Goodyear's synthetic rubber facilities in Houston, Los Angeles, Akron, and Sarnia; and Claude H. Smith, superintendent of the 60,000-ton synthetic rubber plant in Houston, who feels "we are producing the world's best synthetic rubber and producing it faster, more efficiently and more economically than would be possible in any other country in the world."

Started less than a year ago, this new plant follows the standard government formula for all the integrated synthetic rubber plants in the war program. Butadiene is piped into the plant from the Sinclair Rubber Co., which adjoins it. Cost of the plant is estimated at about $12,000,000 by Goodyear officials.

Other Goodyear Activities

Change in the name of the Goodyear subsidiary directing the operation of more than 35,000 acres of fertile land in the Salt River Valley of Arizona from The Southwest Cotton Co. to Goodyear Farms was announced last month. The new name reflects the development of the project originally conceived as a source of supply for long staple cotton, most of which came from the Nile Valley of Egypt until shipping was disrupted by submarine warfare during World War I. Today the growing of cotton is but one of the many agricultural operations on the Goodyear Farms, which include three separate ranches, the Litchfield ranch of 17,000 acres 18 miles west of Phoenix, the Goodyear ranch of 8,000 acres 25 miles southeast of Phoenix, and the Marinette ranch of more than 10,000 acres 16 miles northeast of Phoenix. Production of seed for the commercial market, large-scale raising of livestock, and the growing of field crops and citrus fruit all become important factors in the operations of the Goodyear Farms. Many innovations in agricultural practices have had their origin on this land operated by the Goodyear subsidiary and used as a practical proving ground for the company's rubber products.

Goodyear, on behalf of its shoe products department, is presenting a series of half-hour radio broadcasts over the entire NBC network. The programs, which started November 13, are heard Saturday mornings at 11 o'clock EWT, and originate in the NBC studios in Radio City. The feature, titled "Hook 'n' Ladder Follies" will have Ralph Dumke as master of ceremonies.

On November 15, Goodyear built the 350,000,000th tire in its 42 years of production: an all-synthetic farm tractor pneumatic tire.

Airfoam, in peacetime used for mattresses, furniture seats, automobile covers, etc., is now devoted 100% to the war effort. Among its present uses are as protective covering for boats coming into contact with seaplanes, in tanks, and as "helmets" mounted on the inside of a half-steel ring to protect soldiers' heads while sighting cannon through periscopes or other devices in tanks.

Herman R. Thies, former assistant manager of the Goodyear research laboratory, has been made manager of Goodyear's newly organized plastics and chemical sales division at Akron, it was announced last month by R. S. Wilson, vice president. The new division will devote its activities in the plastics and associated fields, currently working on Pliolite, a rubber derivative used as an insulating material for wire for the Army; Chemigum, synthetic rubber, oil-resistant type, manufactured in the company's privately owned synthetic plant; and deproteinized rubber, employed where low water absorption qualities are desirable.

Robert D. Vickers, research and sales engineer from the company's laboratory staff, R. S. Sanders, and Eileen Marshall, also of that organization, will be members of the new division. Mr. Thies has been with Goodyear since 1930, when he started in the research department. He has been in Akron since 1920, when he was associated with the Miller Rubber Co. Mr. Vickers joined Goodyear in 1929 in mechanical goods compounding and has been with the research department since May, 1933.

M-1, Navy's New Super-Blimp, Dedicated

The *M-1*, largest non-rigid airship ever built in this country, was commissioned into service with the United States Navy at Akron, on Navy Day, October 27. The christening ceremonies were held in the massive air dock of the Goodyear Aircraft Corp., where high ranking Navy officers and officials of the Goodyear organization watched as Mrs. Jean Rosendahl, wife of Rear Admiral Charles E. Rosendahl, broke a bottle of liquid air over the cabin of the ship before a crowd of more than 10,000 persons.

Principal speakers at the ceremony were Mr. Litchfield, chairman of Goodyear Tire and president of Aircraft, who hailed the U. S. Navy as the greatest in the world and pledged continued production excellence at Goodyear, and Rear Admiral Frank D. Wagner, USN, Assistant to the Deputy Chief of Naval Operations for Air, who presented certificates of award to 22 Aircraft workmen, for suggestions which have aided the war production effort. Admiral Rosendahl, chief of Navy's lighter-than-air operations, spoke briefly, as did Captain C. V. S. Knox, USN, inspector of Naval aircraft at Akron. Another speaker was Ed Burroughs, president of Local 856 (C.I.O.), who represented the workers at Goodyear Aircraft. Harry E. Blythe, vice president and general manager of Goodyear, was master of ceremonies.

M-1, Navy's New Goodyear-Built Blimp

The *M-1* is a super blimp, half again as large as the K-ships, now being used by the Navy in coastal patrol work, larger even than the Army's semi-rigid *RS-1*, built in 1924. The new ship has a 50% greater volume of helium than the K-type, giving a substantial increase in cruising radius and bomb carrying load and is known to be faster. The car on the *M-1* is not a single cabin as in present types, but is formed of three connecting units and is integrated by universal joints to allow freedom of motion in coordination with the flexible envelope above. The two outriggers, carrying Wasp engines, are attached to the midship unit, which has a blister below for wider range of observation.

The M-ship design was developed by Navy engineers and the staff of Goodyear Aircraft.

New General Tire Plant

Construction of a four-million-dollar tire plant at Waco, Tex., will be begun as soon as materials can be obtained, according to William O'Neil, president of The General Tire & Rubber Co., Akron. With a daily capacity of 3,500 tires, the plant will be used to ease the critical tire condition throughout the nation. Expanded military demands, increased civilian needs, and the reduction in capacity due to the use of synthetic rubber and the necessity of converting many civilian tire molds to military use have made rapid expansion essential. Because Akron already is a critical labor area not all the needed expansion can be carried on in the rubber capital, and Texas offers many advantages to the tire builder, stated General's president.

"On top of the military need for tires next year, which will be greater than ever before, the industry is being called upon to turn out 30-million passenger car tires," Mr. O'Neil said. "Few have been built since Pearl Harbor, and if we are to keep our cars rolling for essential civilian use we must have added capacity in 1944.

"Some of it will be obtained right in Akron, and the fullest use will be made both of manpower and machines. But that will not be enough. General Tire, therefore, is investing its own money to erect a modern tire plant at Waco and will begin construction as soon as architects drawings are approved, and the necessary materials and equipment are available. We expect to be in operation in the new plant in 1944."

General Tire stockholders on November 19 approved issuance of 75,000 shares of $100 par value of 4½% cumulative preferred stock, of which 65,000 have been taken by an underwriting group. Also authorized is the redemption on December 31, at 105 plus accrued dividends, of all outstanding (21,963 shares) 6% preferred stock of $100 par value.

Firestone Announcements

The Firestone Tire & Rubber Co., Akron, this year expects to bring out of Liberia 35 million pounds of rubber, according to President Harvey S. Firestone, Jr., in a talk on "Rubber in War and Peace" on November 8 before The Economic Club of Detroit, Mich., during which he reviewed the rubber situation and gave a picture of the place that synthetic rubber will have in the postwar world. Mr. Firestone believes that natural and synthetic rubber, because of the inherent qualities of each, will each have a definite place, but not as competitors, in the scheme of things to come. Nor does he believe that synthetic rubber will need tariff protection as it will then be able to compete with and also act as a stabilizer of the price of the natural commodity.

H. M. Taylor has been appointed manager of the manufacturers sales division of Firestone with headquarters in Akron, L. R. Jackson, executive vice president, announced November 20. Mr. Taylor, formerly manager of the Detroit area manufacturers sales organizations, has been with Firestone since 1915. He is succeeded at Detroit by D. J. Hutchins, formerly with the manufacturers sales division in Detroit, who was loaned to the government 21 months ago to become Detroit regional manager of the WPB, he resigned as such recently.

The big pontoon bridge floats for the Army, shown in the accompanying illustration, are being turned out by Firestone. They will support a 15-ton load, when inflated, and will roll into a package four feet square when deflated. The floats are 33 feet long, and much of the assembly and testing work is being done by women.

Toledo Rubber Products Corp. has moved from Middlefield to Waterville to be nearer its sales organization, American Mat Corp., Toledo. In May, 1933, the Toledo Rubber Products Corp., which had been organized in 1929 to manufacture "Ezy-Rug" floor mats, had moved from Toledo to Middlefield to be near the Johnson Rubber Co., its source of rubber supply. Now, however, with rubber unobtainable, the firm has switched to woodlink mats and finds being near Toledo more advantageous. When rubber is again available for mats, the Toledo organization will resume its business with the Johnson company. In its new move the Toledo Rubber Products Corp. makes no change in its executive personnel, which follows: president, Hugh G. Johnson; vice president, E. M. Belknap; secretary, Dudley W. Moor, Jr.; treasurer and assistant secretary, L. M. Silverthorne; general manager in charge of production, E. W. Coble.

Marshall Succeeds Pharis

The Pharis Tire & Rubber Co., Newark, last month announced the election of Furber Marshall as president and the elevation of President Carl Pharis to the chairmanship of the board, in a move to expand Pharis activities by a wider diversification of the products made in its own plants, as well as additional ones offered for sale through its dealers. Details on several projects included in this new program are now being worked out, and public announcement of their nature will be made soon.

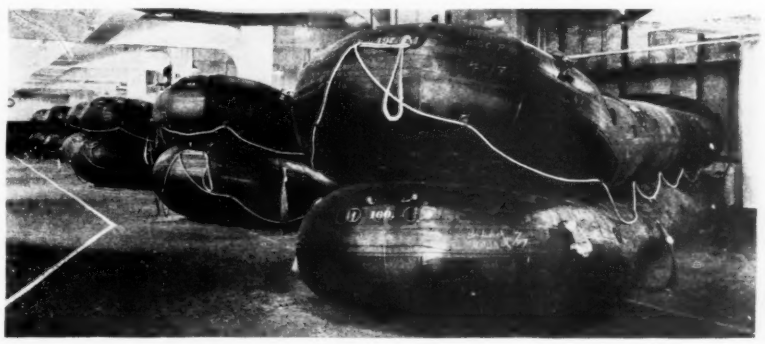
Despite the fact that current Pharis production is devoted largely to the war effort, the critical tire shortage and the problem of keeping the American car on the road have caused Pharis executives and engineers to intensify their efforts to push progressive plans to meet present-day conditions and to develop merchandising methods to strengthen still further Pharis' position in the industry during the postwar period.

The directors stated that in their choice of Mr. Marshall to succeed Mr. Pharis, they were influenced by the desire for an executive familiar with the entire automotive field, since the company's postwar plans call for a substantial increase in the number of automotive products made by it, as well as those assembled—all of which will be available to its dealers. A desire to lighten Carl Pharis' executive burdens, in view of his many years of service to the company, was also a factor in the selection of Mr. Marshall, who comes from Troy, N. Y., following 17 years as president of Bendix Service Corp. and Marshall Asbestos Corp., subsidiaries of the Bendix Corp. Prior to that time he spent eight years in the petroleum industry. He was graduated from Brown University in 1918 and was an aviator in the first World War.

W. H. Pitner continues as vice president and sales manager.

New Appointments at Goodrich

Chester F. Conner has been named assistant general manager, and Fred Lang merchandise manager of the industrial products sales division of The B. F. Goodrich Co., Akron, O., according to E. F. Tomlinson, division general manager. Mr. Conner had previously been merchandise manager; Mr. Lang, manager of sole and heel sales. A graduate of Buchtel College in Akron, the former started with Goodrich in 1910



Big Pontoon Bridge Float by Firestone

as a sales correspondent, went to the Boston branch in 1916, became assistant branch manager in 1920 and remained as such until 1923, when he returned to headquarters in Akron. Named manager of sales promotion for industrial products in 1931, Mr. Conner served in that capacity until made manager of distributer sales in 1942. He was appointed merchandise manager earlier this year. An authority on industrial rubber products, he has served on the advisory staff of the Rubber Director's office in Washington during the last year and has been prominent in mill supply organizations.

Mr. Lang joined the company in 1925, was transferred to the industrial products division a year later, and after holding various executive posts was named operating manager in 1932. He has been manager of sole and heel sales since 1941.

John H. McGill has been made assistant controller at Goodrich, to succeed H. V. Gaertner, recently appointed assistant treasurer, Controller T. B. Tomkinson announced last month. Mr. McGill joined the company's accounting department in 1926, and has been in factory cost accounting since 1928, factory auditor for the last 10 years.

Charles H. Kanavel is now manager of the track and war products department of the national sales and service division at Goodrich, succeeding E. F. Tomlinson, recently named general manager of the industrial products sales division. A graduate of Purdue University with a degree in mechanical engineering, Mr. Kanavel joined the company in 1933, was assistant foreman in the machine maintenance department one year, and a development engineer for rubber tracks and solid tires from 1934 to 1940, when he was transferred to the national sales and service division.

Driving and service rules to help motorists get maximum wear from synthetic rubber tires are outlined in a consumer pamphlet being distributed to buyers of Goodrich Silvertowns made with GR-S. The pamphlet treats of air pressure, care of minor damage, driving speeds, and other factors that should be watched to guard the service life of 1943 tires. Also discussed are Goodrich Ameripol-Silvertowns introduced in 1940—more than 50% synthetic.

Goodrich is marketing a new type of protective skin cream known as Skim-Cote, a lanolin-containing cream for worker protection and time-saving within the plants, according to H. F. Mosher, manager of the company's special industrial merchandise.

Seiberling Rubber Co., Akron, announced last month through J. P. Seiberling, president, it had entered into a contract to sell $1,500,000 worth of 4% sinking fund debentures to the Mutual Life Insurance Co. of New York, subject to approval of preferred stockholders, through a debenture issue. Proxy statements were mailed to the stockholders to secure their consent to the creation of the debenture debt. Mr. Seiberling said that funds derived from this sale will be used to expand plant facilities needed for the manufacture of synthetic rubber tires and tubes under the Rubber Director's tire production program. The company expects to reveal details of its expansion program in a month or so.

MIDWEST

Rubber Section, N. S. C., Officers

The Rubber Section of the National Safety Council, 20 N. Wacker Dr., Chicago, Ill., at the recent annual safety convention elected the following executive committee for 1943-1944: general chairman, Paul Van Cleef, Van Cleef Bros., 7800 Woodlawn Ave., Chicago; vice chairman in charge of program, John E. Lovas, safety supervisor, United States Rubber Co., Passaic, N. J.; secretary, Roland Kastell, assistant to the supervisor of safety, U. S. Rubber, 1230 Sixth Ave., New York, N. Y.; *News Letter* editor, Glen D. Cross, safety director; Firestone Tire & Rubber Co., Akron, O.; engineering committee chairman, Thos. H. Boyd, Manhattan Rubber Mfg. Division, Raybestos, Manhattan, Inc., Passaic; health committee, J. Newton Shirley (chairman), medical director, Arrow Mutual Liability Insurance Co., Newton, Mass., F. S. Mallette, industrial hygienist at Firestone, and B. J. Ficklen, director of safety, U. S. Rubber, Charlotte, N. C.; membership committee chairman, Stanley Wright, safety engineer, Inland Mfg. Division, General Motors Corp., Dayton, O.; members-at-large, E. W. Beck, supervisor of safety, U. S. Rubber, New York, R. A. Bullock, personnel director, Corduroy Rubber Co., Grand Rapids, Mich., Ralph S. Farnum, safety supervisor, U. S. Rubber, Detroit, Mich., John L. Grider, personnel manager, Gould & Eberhardt, Newark, N. J., Oliver Hopkins, supervisor of safety, U. S. Rubber, Providence, R. I., C. F. Horan, manager of hygiene and safety, Hood Rubber Co., Watertown, Mass., J. M. Kerrigan, manager of industrial relations, U. S. Rubber Reclaiming Co., Buffalo, N. Y., W. H. MacKay, employment manager, Dunlop Tire & Rubber Corp., Buffalo, R. W. Morse, safety director at Firestone, and R. M. Weimer, personnel director, Dayton Rubber Mfg. Co., Dayton.

The N. S. C. industrial safety engineering division activities recently were reorganized to provide more practical and specific assistance with accident and health problems in modern industry. Assigned as staff contact man for the chemical, rubber, and refrigeration industries was Floyd Van Atta.

Monsanto Chemical Co., St. Louis, Mo., according to President Charles Belknap, on October 29 elected Francis J. Curtis a vice president, to have charge of the company's long-range program of development here and abroad, including general research and general sales development. Since 1938, Mr. Curtis has been director of development at Monsanto, to which he came in 1929 from the Merrimac Chemical Co., when it was absorbed by the St. Louis organization.

J. Handly Wright, effective December 1, has been made director of the department of industrial and public relations at Monsanto, in charge of advertising, public relations, industrial and labor relations, safety program, and company publications. Mr. Wright has had a long and varied career in newspaper and publicity work.

Wilburn F. Bernstein, formerly chief chemical engineer of Victor Mfg. & Gasket Co., Chicago, has opened consultant engineering offices at One North La Salle St., Chicago 2, Ill.

Federal Reserve Bank of Chicago, Ill., recently reported that employment in the rubber goods slumped markedly in its district after the outbreak of war because of the shortage of rubber, but now it has nearly attained the prewar level as substitute materials have become available. Payrolls have followed the same general trend, but at present are nearly 45% above their prewar peak.

Michael N. Brady, for the past 13 years associated with the United States Rubber Co., 1230 Sixth Ave., New York, N. Y., and prior to that with the Firestone Tire & Rubber Co., Akron, O., has joined the National Enameling & Stamping Co., Milwaukee, Wis., as vice president in charge of sales.

NEW ENGLAND

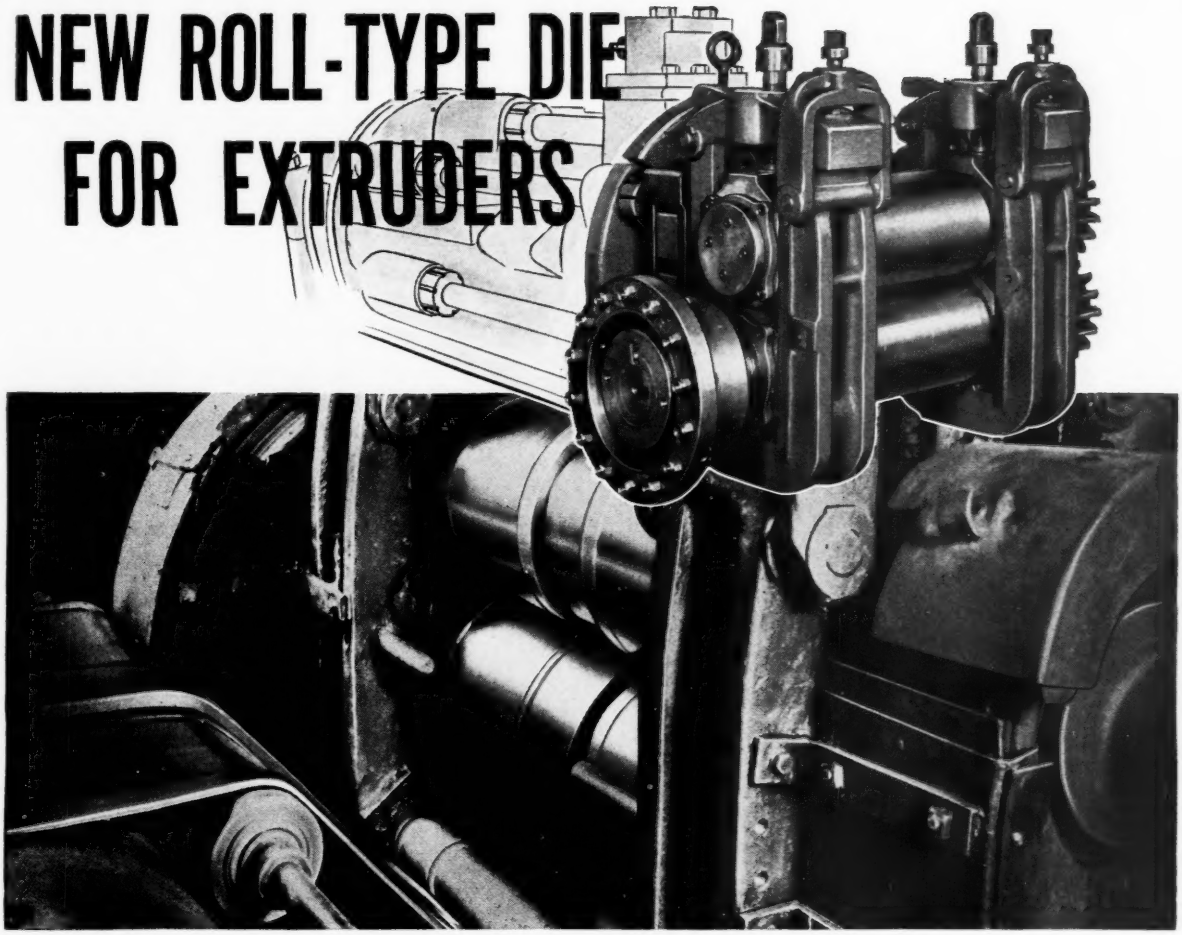
Hodgman Opens New Laboratory

At an "Open House" celebration on October 21 the Hodgman Rubber Co., Framingham, Mass., entertained some 75 guests including representatives of competitive firms, chemical and pigment supply companies, the Army, Navy, government rubber agencies, miscellaneous business firms and several public officers from the Town of Framingham, in connection with the opening of a new laboratory building. Hodgman is a growing organization engaged primarily in the coating of cloth with rubber and plastics and is now engaged solely in war production. The method of processing and thermosetting polyvinyl butyral resin was discovered in the Hodgman laboratory by Joseph Haas, technical director of the company. In addition to the production of coated fabrics, the company has also started the extrusion of the vinylidene chloride plastic, Saran, which in the form of tubing is replacing copper and other strategic materials in many fields.

After an inspection of the new laboratory the guests were taken on a tour of the plant itself, after which a cocktail party and dinner took place at the Framingham Country Club.

Warwick Chemical Co., West Warwick, R. I., through Ernest Nathan, President, has announced the creation of a fully owned subsidiary, Warwick Wax Co., Inc., with offices at 580 Fifth Ave., New York, N. Y., to handle Warwick Chemical's extensive wax business. Officers of the new corporation, besides Mr. Nathan, president, are Ernest Stossel, executive vice president, and Dale S. Chamberlin, treasurer. Warwick Wax will handle synthetic waxes made by Warwick Chemical and will also

NEW ROLL-TYPE DIE FOR EXTRUDERS



A REVOLUTIONARY new type of extruding die that does for rubber what the continuous strip mill has done for steel is now available to all rubber manufacturers.

Known as the Roller-Head die, it takes the place of the conventional plate die on rubber extruders. Engineers of The B.F.Goodrich Company originated this new principle of shaping extruded rubber and it has been thoroughly and completely proved by several years of production operation.

ARMY E NAVY
CLIFTON DIVISION

Now we can make this important development available to all. Here are some of its advantages:

1. Unlike the conventional plate die, it compresses and compacts the stock, giving greater density, better wearing qualities and improved surface finish;
2. It holds stock to closer tolerances;
3. It materially reduces the amount of preliminary milling, producing a higher quality stock, saving time, labor and cost;
4. It can be used in multiple setups to lay a high-grade stock on a less expensive compound for economical manufacture without sacrificing quality where it is needed;
5. It can handle natural and synthetic rubber, reclaim and many of the elastomeric compounds;
6. Rolls can be changed quickly and simply to produce a wide variety of shapes;
7. It can be used on any standard make of tuber;
8. Alterations in the production system are unnecessary—it can be readily installed with existing equipment.

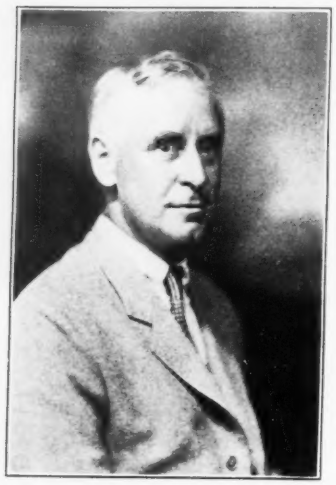
As manufacturer of this important improvement in rubber processing, as well as a full line of tubers from 2″ to 12″, we are in a position to furnish you with complete information. Our engineers are at your service.

National Rubber Machinery Co.

GENERAL OFFICES · AKRON, OHIO

Creative Engineering

act as exclusive sales agent for Western Wax Co., an affiliate of Warwick Chemical. Western Wax Co. manufactures a wide variety of micro-crystalline and amorphous petroleum waxes.



F. H. Banbury

F. H. Banbury Retires

Farrel-Birmingham Co., Inc., has announced that Fernley H. Banbury has, at his own request, retired from active management of the Banbury mixer department and in the future will act in a consulting capacity, with headquarters, as formerly, at the company's main offices at Ansonia, Conn. Mr. Banbury is internationally known for his invention of the Banbury mixer, which has revolutionized mixing processes in rubber and plastics plants throughout the world. He has been connected with Farrel-Birmingham Co. for 27 years and has been manager of the Banbury mixer department for the past 15 years.

Mr. Banbury was born in England. After studying steam, mechanical and mining engineering in that country he came to America and received a B.S. degree in electrical engineering at Purdue University. For several years he was associated with prominent utility and engineering interests in Chicago and later worked with Dr. Acheson, inventor of carborundum in the technical and commercial development of new products. In 1916 he joined Birmingham Iron Foundry and for ten years was works manager of that plant, which later became part of Farrel-Birmingham Co. For more than a quarter-century he has devoted most of his time and attention to developing ways of increasing the mechanical and operating efficiency of the mixing machine bearing his name and to working out many new applications for it. Since the issue of the basic patent Mr. Banbury has been granted 24 additional United States patents covering improvements to the mixer, which has added steadily to its reputation for producing uniformly mixed stocks of better quality, with appreciable savings in power and labor costs.

In February, 1940, Mr. Banbury was awarded a Modern Pioneer Scroll of

D. A. Comes

Achievement, an honor conferred on outstanding inventors and research scientists in various fields of industry by the Modern Pioneer Awards Committee, under the sponsorship of the National Association of Manufacturers. This award was made to Mr. Banbury for his notable service to industry by his invention of the Banbury mixer.

Mr. Banbury has been succeeded by D. A. Comes, associated with Mr. Banbury in his work for the past 21 years. Mr. Comes joined the Birmingham Iron Foundry in 1922 and for a number of year has maintained offices at Hackensack, N. J. As manager of the Banbury mixer department, he will now make his headquarters at Ansonia.

D. G. Warner has been appointed assistant manager of the department. Mr. Warner joined Birmingham Iron Foundry in 1912 and has been connected with the Banbury mixer department since 1928.

Giant Airplane Tire Mold of Meehanite

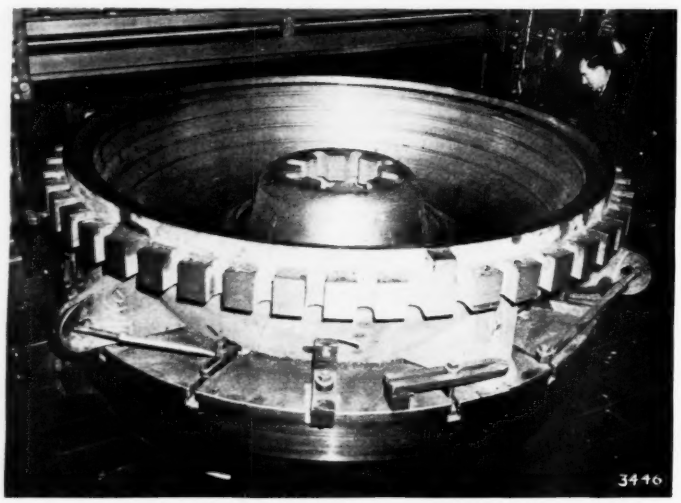
Farrel-Birmingham recently completed one of the largest tire molds ever made, which weighs 30 tons and is now being used by a leading rubber company for producing 110-inch diameter tires. Each of these giant tires alone weighs 1,800 pounds.

Process GM Meehanite was selected for this mold because of its superior physical properties, which give it high strength, close-grained structure, and free machinability. In a mold such as this the metal must be very close-grained with all surfaces absolutely free of imperfections so that the rubber, after vulcanization, will have a smooth, even surface. Made by the Randupson cement process of molding, each of the two 15-ton castings making up the mold were poured, and all machine work was done at Farrel's Ansonia plant. After cleaning, the castings were heat treated to eliminate possible residual casting stresses.

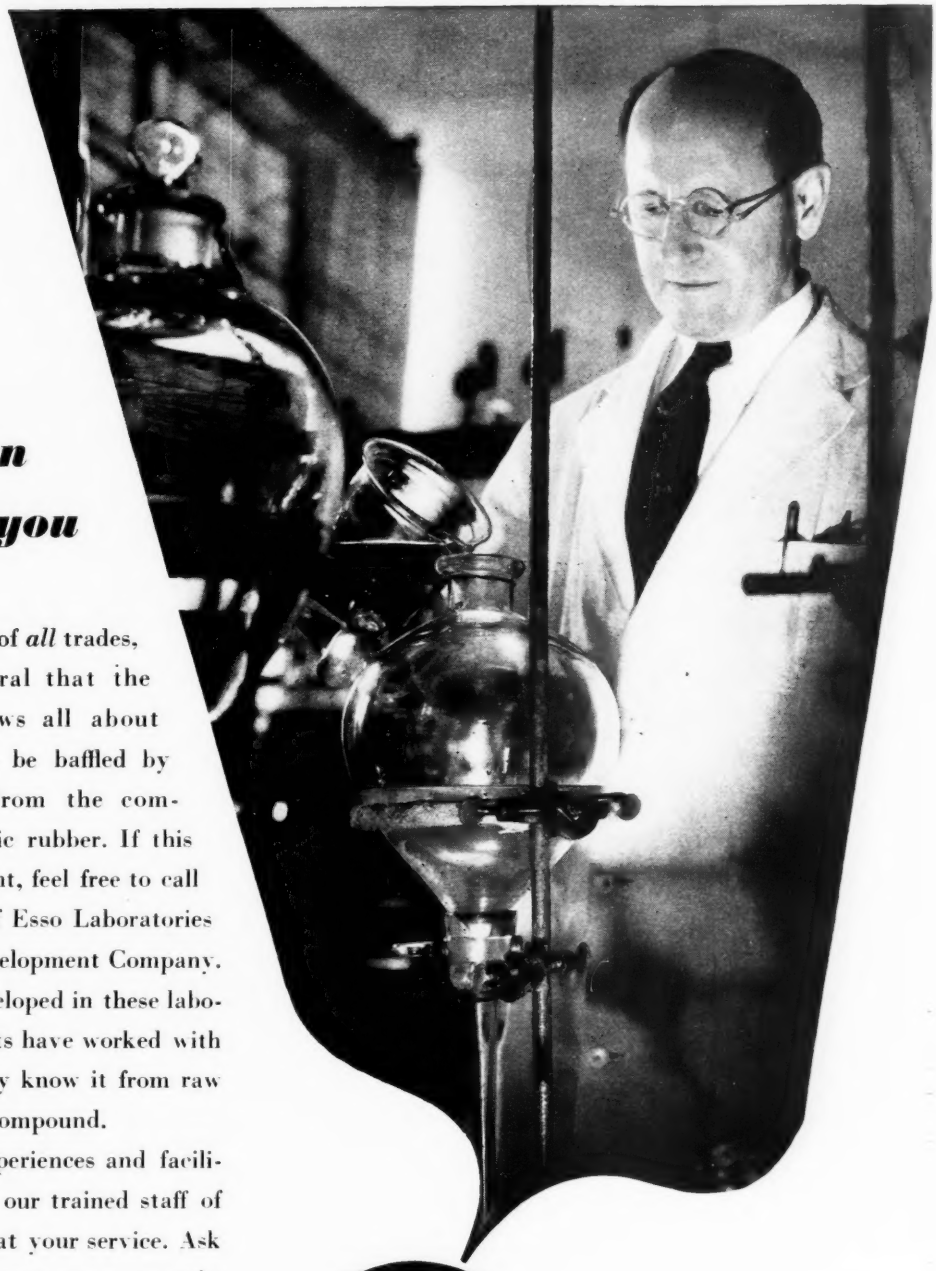
CANADA

C. D. Howe, Minister of Munitions and Supply, Ottawa, Ont., has announced that all passenger-car owners now may have their tires retreaded with passenger-type camelback without a tire ration permit. Reclaimed rubber is used primarily for mixing with other rubber in making military or essential vehicle tires. Small quantities, however, now can be diverted to the retreading of passenger-car tires, the Minister said. Rubber for the manufacture of non-military tires continues to be short, despite increasing production of synthetic rubber, and tire sales to civilians are still controlled by a strict quota system. Non-essential civilian passenger-car owners are not expected to obtain any kind of new tire until after the war.

Gutta Percha & Rubber, Ltd., Toronto, Ont., plans a three-story addition of 20,000 square feet to its plant. F. A. Warren, president and treasurer, has been appointed to the executive council of the Canadian Manufacturers' Association, Toronto.



One of the Largest Tire Molds Ever Made



We can help you

No man can be jack of *all* trades, and it's only natural that the engineer who knows all about natural rubber may be baffled by problems arising from the compounding of synthetic rubber. If this happens in your plant, feel free to call on the experiences of Esso Laboratories of Standard Oil Development Company.

Perbunan was developed in these laboratories. The scientists have worked with it for years, and they know it from raw material to finished compound.

Not only their experiences and facilities, but the help of our trained staff of field technicians are at your service. Ask these men for the answers to your problems . . . and you'll save yourself a lot of time and effort!

PERBUNAN
REG. U. S. PAT. OFF.

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

Write
STANCO DISTRIBUTORS, INC.
26 Broadway, New York 4, N. Y.

Warehouse stocks in New Jersey, Louisiana, and California

Wartime Price & Trade Board, Ottawa, Ont., has revoked restrictions on the sale of protective rubber garments. Reclaimed rubber now may be used in their manufacture instead of crude rubber, according to Rubber Controller Alan H. Williamson, for the supply of reclaim is more adequate than formerly. Protective rubber garments mean any of the following, of which rubber is the component material: standard long and standard three-quarter coats, firemen's coats, mining and fishing suits, sou'westers, mining hats, and acid resisting aprons.

National Research Council, Ottawa, Ont., is testing for rubber content stands of milkweed found on Walpole Island on the St. Clair River 23 miles south of Sarnia. Reports indicate this milkweed has higher latex content than other sources investigated in the Province of Ontario. Milkweed leaves now may be shipped green without any drying, and it does not matter whether they have been frozen. Payment is being made for milkweed on a basis of 3¢ a pound dry weight, but green or frozen milkweed leaves will be accepted. The latex is sought as a component for use with synthetic rubber manufactured at Sarnia, Ont.

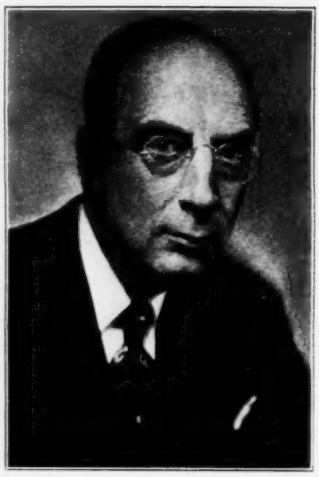
William H. Bremner, former manager of the Woodstock Rubber Co., Ltd., is in New Zealand in connection with setting up a rubber plant which will be in operation within a few months.

Miner Rubber Co., Ltd., Granby, P. Q., recently held ceremonies at the home of President W. H. Miner for the induction of 31 new members into "The Miner Twenty-Year Club." Each new member received a check for $500, a gold watch, and a "Long Service" certificate. Presentations were made by Mr. Miner, his wife, who is vice president of the company, John Miner, treasurer, and J. A. Elder, K. C., a director. Expressions of appreciation to the company came from T. Y. O'neill, general sales manager, and Felix Maranda, manager of the Quebec City branch. The club, which was founded in 1929, now has a total of 224 members, 168 of whom are still in active service.

Canadian Council of Highway Users was formed in Toronto, Ont., October 13, to act in the best interests of the automotive industry and highway users throughout the Dominion. Participating at the initial meeting were more than 350 representatives of the Rubber Association of Canada, coach lines, automotive, rubber, trucking, oil, farm machinery, and gasoline industries, and of the Canadian Automobile Chamber of Commerce, Good Roads Association, and Ontario Motor League.

H. W. Gregory, vice president, Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., recently stated that the manufacture of synthetic rubber inner tubes soon would be started in the Dominion. He does not anticipate any increase in the production of synthetic tires for civilians because of the manpower shortage, which is also very evident in the recapping industry.

OBITUARY



Bachrach
David A. Cutler

David A. Cutler

DAVID ADELBERT CUTLER, president and treasurer of the Alfred Hale Rubber Co., North Quincy, Mass., special assistant to Rubber Director Bradley Dewey, and chief of the Washington Bureau of New Ideas & Inventions, died suddenly November 9 at his home in Wollaston, Mass. Mr. Cutler was born November 6, 1879, in Wakefield, Mass. He attended Concord High School (1892-94), Acton High School (1895-96), and Burdett Business College (1897) and then took a special course in chemistry at Wesleyan University in 1900. His rubber career began with the Hood Rubber Co., Watertown, Mass., in 1897. Two years later he joined the Goodyear Rubber Co., New York, N. Y., and in 1901 switched to the Apsley Rubber Co., Hudson, Mass. From 1902 to 1908 he served as chemist for Manhattan Rubber Co., New York, N. Y., and Manufactured Rubber Co., Philadelphia, Pa., and was technical adviser to Inter- and Continental Rubber Co., New York, from 1908-1915. Then in 1909, Mr. Cutler became associated with the Revere Rubber Co., Boston, Mass., and the following year was made general manager of development for the United States Rubber Co., New York. He headed the Acushnet Process Co., New Bedford, Mass., in 1914 where he remained until he obtained control of Alfred Hale Rubber in 1916. It was Mr. Cutler, too, who investigated the Kaysam process in Europe and who helped organize the Kaysam Corp. of America, New York, of which he was a director from 1935 to 1937.

The late executive was chairman of the Rubber Division of the Massachusetts Foundation and president of the Neighborhood Club of Quincy and a member of Aleppo Temple, A. F. and A. M. Also he was a past president of the Associated Industries of Massachusetts, Quincy Chamber of Commerce, Quincy Rotary Club, and Quincy Taxpayers' Association, and had been chairman of the NRA for New England during the time of that program. The Unitarian Church of Wollaston found him an active participant.

Private funeral services were held November 12 at Quincy. Burial was in Mt. Hope Cemetery, West Acton, Mass.

He leaves his wife, two daughter, three sons, five grandchildren, and three sisters.

Elbert C. Shephard

CORONARY thrombosis caused the death, on October 25, of Elbert C. Shephard, secretary-treasurer and a director of the Baldwin Rubber Co., Pontiac, Mich., which he had joined in 1932. From 1920 to 1928 he had been assistant treasurer of the Oakland Motor Car Co.

The deceased was born September 5, 1891, at Fort Scott, Kan. He attended the Universities of Valparaiso and of Denver. He was also treasurer of the Michigan Mfg. Association and of Dayton Porcupine Mines, Ltd., (Canada), a director of the local Chamber of Commerce, and a member of the Masons, Presbyterian Church, Scottish Rite Consistory and the Shrine.

Private funeral services were held at Pontiac, with interment October 28 in White Chapel Memorial Cemetery, Birmingham, Mich.

Survivors include his mother, the widow, two daughters, a son, and a sister.

Michael Doyle

MICHAEL DOYLE, for 40 years president of International Pulp Co., New York, N. Y., and also head of United States Talc Co. and Union Talc Co., succumbed to pneumonia in New York on November 26. Born in Ireland, 83 years ago, Mr. Doyle was the former treasurer of the Mohawk Condensed Milk Co. and one of the founders of the Rochester, N. Y., Chamber of Commerce, of which he was president in 1904. His first business venture here was in the fruit exporting line, for which he established Michael Doyle & Co. Also at one time he was president of the old Rochester & Manitou Beach Railroad and at his death was president of the Oswegatchie Light & Power Co., Gouverneur, N. Y., and a director of several utility companies in New York State.

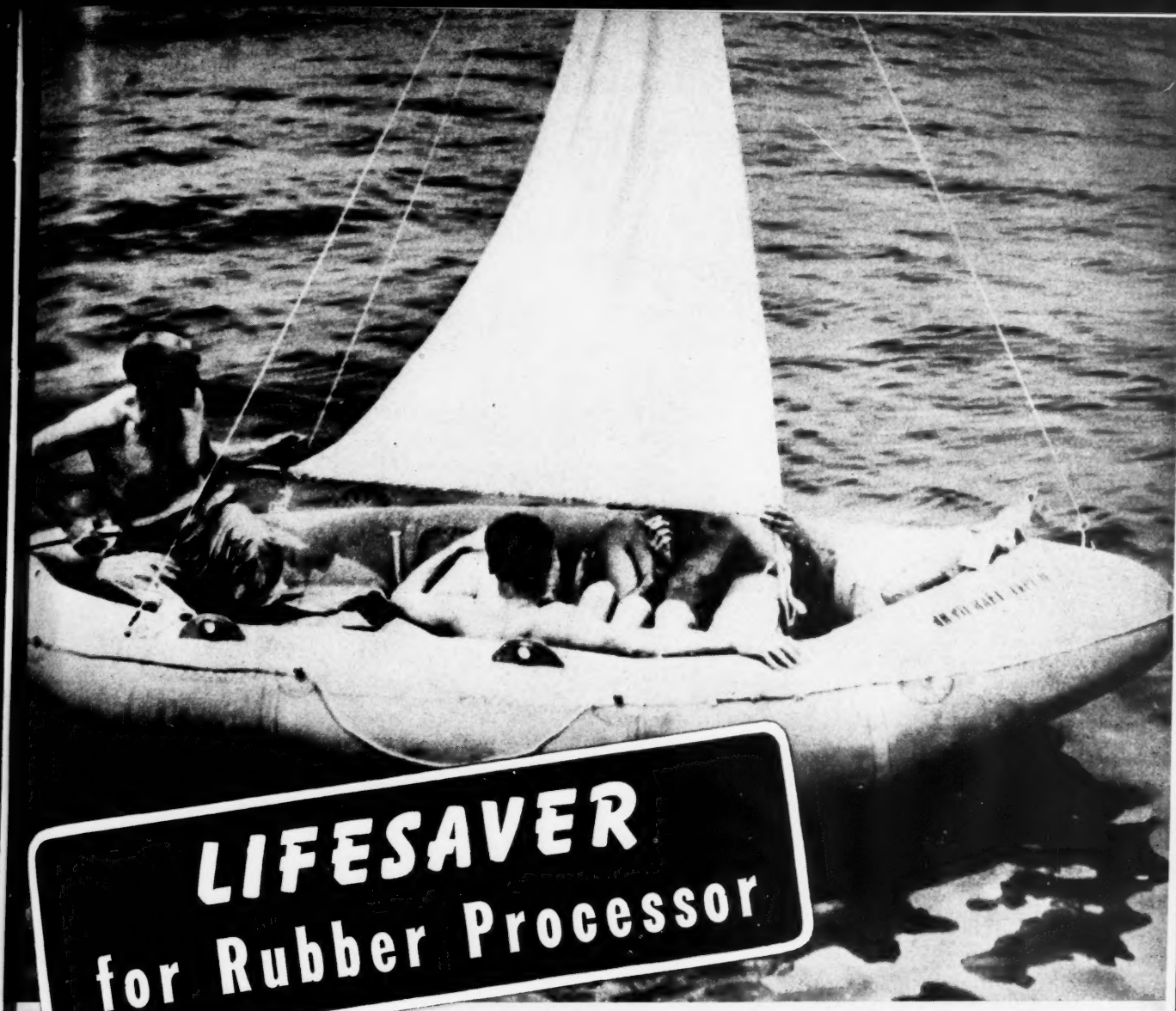
An active civic and charitable worker in Rochester, the deceased helped found Highland Hospital there. He was a member of the Knights of Columbus and of St. John's Church of Rochester, where funeral services were held.

Three children, eleven grandchildren, and two great-grandchildren survive him.

Charles B. Seabury

ON NOVEMBER 7 at St. Petersburg, Fla., died Charles Bailey Seabury, who had retired in 1930 as vice president of the Boonton Rubber Co., Boonton, N. J., with which he had been associated eight years. His previous business connections had been with the Victor Talking Machine Co., H. W. Johns Co. (now Johns-Manville Co.), and Henry Holt & Co.

Mr. Seabury, who was born in Gardiner, Me., February 5, 1857, attended Gardiner



SUN RUBBER PROCESSING OILS

"Provided Qualities They Could Not Obtain With Any Other Plasticizer"

With the lives of American boys at stake, there can be no compromise with the specified physical properties of rubber compounds for Army and Navy uses. Yet meeting these specifications often presents problems that are seemingly unsolvable. Sun Engineers and Sun Rubber Processing Oils have helped many rubber processors to overcome such obstacles.

In one recent case, a prominent rubber manufacturer who is now making essential war products of synthetic and natural gum rubber, had been unable to secure the required softness and flexibility, even after trying out a number of different processing oils. Then a Sun Engineer was called in. After studying the problem, he recommended Circo Light Processing Oil. Tests proved the soundness of his recommendation.

In production, they soon found that Circo Light Processing Oil not only provided the qualities not obtainable with other plasticizers, but gave them other advantages as well. It proved highly compatible with their compounds, minimized blooming and migrating . . . and saved up to 15% in milling time. Loadings as high as 15% of Circo Light Processing Oil in synthetics and 28% in natural rubber compounds are not unusual.

A Sun Engineer . . . one of those capable "Doctors of Industry" . . . is always at your service to assist in overcoming compounding problems, reducing costs and speeding up production. Write to . . .

SUN OIL COMPANY • *Philadelphia 3, Pa.*

Sun Oil Company, Limited, Toronto, Canada

SUNOCO

SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA

High School and Bowdoin College, graduating from the latter in 1877, and then served as principal of Gardiner High for six years. He was also a member of Psi Upsilon.

He leaves his wife, a son, three grandchildren, and eight great-grandchildren.

Funeral services were conducted at his late residence in Boonton, and burial was in Greenwood Cemetery there November 11.

Robert Knoblock

ON OCTOBER 30, Robert Knoblock, sales representative for the Pequanoc Rubber Co., Butler, N. J., for the past 17 years, passed away in South Bend, Ind., after an attack of pneumonia. Mr. Knoblock, who was born in South Bend on March 29, 1881, had been associated with the Rubber Regenerating Co., Mishawaka, Ind., for 21 years in the capacity of superintendent and then factory manager before joining Pequanoc.

Interment took place at Highland Cemetery in South Bend on November 2.

He leaves a wife, two sisters, and three brothers.

FINANCIAL

American Cyanamid Co., New York, N. Y., and subsidiaries. First nine months, 1943: net income, $5,048,475, equal, after preferred dividends, to $1.73 each on 2,639,026 common shares outstanding, contrasted with $3,733,629, or $1.27 a share on 2,618,364 shares in the corresponding period last year; taxes, $14,910,358, against $10,154,394.

Boston Woven Hose & Rubber Co., Cambridge, Mass. Year ended August 31, 1943: net earnings, after all charges, $365,878, equal, after preferred dividends of $6 a share, to $3.73 a common share, contrasted with $595,798, or $6.40 a common share, in the preceding fiscal year; taxes, $497,277, against $935,845; gross sales, $10,750,878, against $10,480,170; inventories, $2,264,009, against $2,081,829; current assets, September 1, 1943, $5,355,195, including $570,002 cash, against $5,402,900, including $655,546 cash, a year earlier; current liabilities, $980,004, against $1,220,760.

Crown Cork & Seal Co., Inc., Baltimore, Md., and wholly owned domestic subsidiaries. First nine months, 1943: net profit, subject to renegotiation, $1,157,069, or $1.50 a common share, against $1,312,132, revised, or $1.80 a share in the 1942 period; taxes, $2,123,513, against $1,171,037.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Third quarter: net income, $14,934,289, equal, after preferred dividend requirements, to $1.17 a common share, compared with $16,476,651, or $1.32 a share, in the same quarter last year; net sales, $151,211,095, against $125,541,843; provision for federal taxes, $31,772,000, against $19,702,000.

Robert Knoblock

Baldwin Rubber Co., Pontiac, Mich. Year ended June 30, 1943: net profit, $310,296, or 98¢ a share, contrasted with $316,040, or $1 a share, in the preceding fiscal year; federal income and excess profits taxes, $550,623, against $144,290.

Belden Mfg. Co., Chicago, Ill. First nine months, 1943: net income, $353,273, equal to $1.46 each on 241,547 common shares, compared with $348,134, or $1.44 a share, in the 1942 period; federal taxes, $885,000, against $929,246; reserve for contingency, $45,170, against $44,449; net sales $8,345,948, against $7,237,506.

Columbian Carbon Co., New York, N. Y., and subsidiaries. Nine months to September 30: net profit, $2,022,219, equal to $3.76 each on 537,400 capital shares, against $2,140,999, or $3.98 a share, in the 1942 period.

Electric Hose & Rubber Co., Wilmington, Del. Year ended August 31: net profit, $121,979, against $164,227, in the preceding 12 months.

Faultless Rubber Co., Ashland, O. Year ended June 30: net profit before renegotiation of war contracts, $119,001, or $1.82 a common share, against $130,367, or $1.99 a share, in the previous fiscal year.

General Cable Corp., New York, N. Y. First nine months, 1943: net income, $1,609,150, against $1,797,302 in the corresponding period of 1942; provision for taxes, $6,575,000, against $10,605,000.

General Electric Co., Schenectady, N. Y. First nine months, 1943: net profit, $31,433,933, or $1.09 a common share, against $30,710,499, or $1.06 a share, in the like 1942 period; net sales billed, $980,226,836, against $654,882,607; total earnings, $345,000,000 against $271,000,000; orders received, $1,999,904,042, against $1,339,448,946; provision for federal income and excess profits taxes, $201,000,000, against $114,000,000.

Garlock Packing Co., Palmyra, N. Y., and subsidiaries. First half, 1943 net income, $450,368, equal to $2.15 a share; provision for income and excess profits taxes, $1,175,961; reserve for contingencies, $110,000.

General Tire & Rubber Co., Akron, O., and subsidiaries. Nine months to August 31: net profit, $1,329,398, equal to $2.34 a common share; adjusted net profit (after renegotiation settlement, reduced provision for contingencies, and restored provision for bad debts) for fiscal year ended November 30, 1942, $936,766, or $1.52 a common share.

Hercules Powder Co., Wilmington, Del. Nine months ended September 30: net earnings, $4,223,270, equal, after preferred dividends, to $2.91 each on 1,316,710 outstanding common shares, contrasted with $3,143,457, or $2.09 a share, in the 1942 period; net sales $91,940,775, against $85,290,589.

Monsanto Chemical Co., St. Louis, Mo. Nine months: net income, $4,145,705, or $2.77 a common share, against $2.76 a share last year.

Philadelphia Insulated Wire Co., Philadelphia, Pa. First half, 1943: net profit, $30,143, against a net loss of $1,917 last year.

Phillips Petroleum Co., Bartlesville, Okla. First three quarters, 1943: consolidated net income $10,939,171, equal to $2.38 each on 4,590,595 average capital shares outstanding, compared with $10,481,332, or $2.36 a share, in the 1942 period.

Skelly Oil Co., Kansas City, Mo., and subsidiaries. First nine months, 1943: net profit, $3,864,574, or $3.93 a share, against $3,927,202, or $4 a share, in the same period of 1942, taxes, $4,168,800, against $2,945,800.

Thermoid Co., Trenton, N. J., and domestic subsidiaries, except Joseph Stokes Rubber Co. Nine months: net profit, $535,023, equal to 98c a common share, against $452,024 (revised), or 80c a share, in the like period of 1942; taxes, $799,800, against $424,400; reserve for specialty year-end comparison, $191,000, against $125,000.

Timken Roller Bearing Co., Canton, O. Nine months to September 30: net profit, subject to renegotiation and including $1,723,300 postwar credit, $4,912,525, equal to $2.03 a share, compared with $4,786,955, or $1.98 a share, in the same period last year.

United Carbon Co., Charleston, W. Va., and subsidiaries. First nine months: net profit, $1,340,590, or $3.37 a share, against $1,285,842, or $3.23 a share, in the corresponding months last year; taxes, $1,027,000, against $1,186,000.

S. S. White Dental Mfg. Co., Philadelphia, Pa., and subsidiaries. First half, 1943: net profit, $383,479, equal to $1.28 a share, against $256,360, or 85c a share, in the first half of 1942; income and excess profits taxes $1,122,832, against $576,157.

Looking to the time when there is Good Will again among all men . . .

WHEN all the planning and organization of effort will be turned to construction . . . When the courage of men will no longer be weighed in deadly cataclysm, but in eagerness to serve humanity . . . When the faces of boys show not the grimness of lethal purpose, but the brightness of hope for living, for opportunity, for happiness . . .

When there can be fellowship again among all men, fusing earnest desire with enterprise to provide better services and better goods for peaceful comforts . . .

Then the materials we have so patiently allotted to the needs of war will be given their rightful chance to serve the *wants* of people . . . Then the research that fathered their perfection and purpose will be an assured contribution to the quality you will build in those *wants*.

* * * *

Today sees the marshalling of every effort, every product to the end that the time may be shortened when there is Good Will again among all men . . . We are looking to that time, knowing that as we serve *now* for the vital needs we will be better able to serve *then* for the peaceful wants.

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LATIN AMERICA

Progress of Rubber Experiments

The research work on rubber growing in various Latin American countries with the aid of the United States is beginning to bear fruit, as reports from the experiment stations indicate. Thus the cooperative agricultural experiment station set up jointly by Nicaragua and the United States near El Recreo is actively engaged in a program of building *Hevea* and for this purpose has established extensive nurseries both at El Recreo and Cukra Hill.

The experiment station at Tingo Maria, Peru, also has set out rubber nurseries said to be showing especially good progress.

The Peruvian-Amazon Corp., aided by a credit received from the Export-Import Bank of Washington, is developing a demonstration plantation of *Hevea*. It has obtained about 250,000 rubber seeds from Central America from *Hevea* planted years ago and said to be superior to Amazon *Hevea*, in addition to 25,000 budded *Hevea* stumps from Central American experiment stations.

In cooperation with Panama, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Mexico, George L. Seeley, production specialist of the Rubber Development Corp., has established schools where improved methods of tapping *Castilloa* trees will be taught in a three-week course. He is to set up similar tapping schools in Ecuador, Colombia, Venezuela, British Guinea, and Trinidad. *Castilloa* should be tapped only twice a year, in contrast with *Hevea*, which is usually tapped every other day. Formerly a worker slashed at the *Castilloas* with a machete, but now he is taught to tap it on the herringbone system with a special knife—that is, he first makes an incision up the side of the tree and then lateral cuts which join this incision at an acute angle, thus forming the so-called herringbone pattern. In addition tappers are taught how to hoist themselves up into the trees with the aid of rope belts so as to be able to tap high up the trees. The new methods enable tappers to bring in considerably more latex daily than formerly, with much less harm to the trees.

HAITI

The rubber project in Haiti[1] differs from that undertaken in other American countries in that it is mainly *Cryptostegia*, a vine, that is being exploited. The Haitian-American Development Corp., or Shada, as it is commonly known, has set aside 100,000 acres for planting this vine. Of this area, 32,000 acres have already been planted, to be increased to 85,000 acres by the year end, it is reported.

Tapping has already begun on 1,500 acres; 8,000 to 10,000 acres are to be tapped by Christmas; 20,000 to 25,000 acres by the second quarter of 1944, and the whole of the 85,000 acres by the third quarter of next year.

Planting and tapping presented many difficulties at first. Thousands of acres of wild land had to be cleared; nurseries established to produce millions of young plants to be subsequently planted out in the fields; the vagaries of the plant learnt and suitable tapping methods to be devised; and all this had to be done with labor totally unfamiliar with the work, who had to be taught every step in these operations.

When tapping was first started, the cost of rubber worked out at 61 cents a pound, an amount which does not include amortization of the United States loan to Shada. But the use of improved tapping methods and selected planting material, as well as the increasing skill of all workers, promise a substantial reduction in costs. A first step in the right direction was made when George van den Berghe, a research assistant at the Gonaives research station, invented a tapping stick which with the aid of a clamp holds about 10 *Cryptostegia* whips together so that they can be bled at a single stroke and the flow of latex conducted into a single receptacle. Tappers, furthermore, are acquiring greater speed as they become used to the new work, and some seem to have been able to increase their output from one acre to 1.7 acres per men per day.

[1] INDIA RUBBER WORLD, May, 1943, p. 148; June, 1943, p. 259.

Resin and Lacquer Emulsions

—Developed to meet the need for *Substitutes, Extenders* and *Modifiers* for NEOPRENE, BUNA RUBBER and RECLAIM LATICES

VULPRENES—Solid Modifiers and Substitutes

—for CRUDE, RECLAIMED and SYNTHETIC RUBBERS

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The average yield per cutting now is 13 drops, and the crop per acre, 200 to 300 pounds. But there are possibilities of increasing the yield per acre to 400 pounds and over by still further improvement in tapping methods.

Experiments indicate, it is claimed, that more and better rubber can be obtained from the trunks, which in older *Cryptostegia*, are sometimes five or six inches thick, instead of the individual whips, and it seems that large amounts of latex are also yielded by the fruits of the plant. Finally selection and propagation of high-yielding vines are being studied. It is said that in the nurseries are individual plants which yield more than 100 drops per cutting (against present average of 13 drops), so that the outlook for producing *Cryptostegia* rubber at a competitive price has some promise.

Meanwhile it is hoped to obtain 3,000 tons of *Cryptostegia* rubber in 1944 and eventually 12,000 tons annually from the 85,000 acres by present production methods, although more will be harvested when new, higher-yielding strains have been developed. Shada has also planted 6,000 acres of *Hevea*, expected to yield 1,000 pounds of rubber an acre when mature, against 300 pounds from *Cryptostegia*. The goal for both *Hevea* and *Cryptostegia* is 25,000 tons annually.

While work on *Cryptostegia* in Haiti is progressing favorably, despite initial difficulties, a small experiment undertaken by the *New York Daily News* in Brownsville, Tex., on the Mexican border, has been so discouraging in its results that it has been decided that *Cryptostegia* as a commercial rubber crop in the United States is a failure. The details of this experiment presented indicate that much the same troubles met with and overcome in Haiti were encountered in the Brownsville experiment, but in the latter instance there seems to have been an unexpected development—the plants began to flower, and the succulent whips from which the latex is chiefly drawn at present, became tough, wiry, and useless for tapping.

BRAZIL

A scrap rubber drive organized by the Brazilian Assistance League, recently ended with a yield of some 6,613,000 pounds of old rubber.

Chile is Brazil's third best customer in Latin America. Among the goods imported by the former country are raw and manufactured rubber, which in 1942 amounted to a value of 8,142,000 cruzeiros (cruzeiro=$0.0606). Of this, fine crepe rubber represented 2,287,000 cruzeiros, rubber thread, 1,131,000 cruzeiros, and footwear, tubes, and tires, 4,724,000 cruzeiros.

Ivo Manoel discusses the specific gravity of Mangabeira and Manicoba rubbers in a recent issue of *"Revista de Quimica Industrial."* He worked out his calculations on vulcanized samples of these rubbers. The results for Manicoba were fairly uniform although two different compounds were used; in the case of Mangabeira results were sufficiently uniform for the various samples of the same compound, but differed markedly for the two compounds of this rubber tested. It is thought that possibly the nature of the compounds may have had some influence. The acetone extract is also thought to have been a factor; in the case of Manicoba it was about 3%; whereas for Mangabeira it showed variations between 12 and 14%. From the data obtained Mr. Manoel concludes that the specific gravity for Mangabeira may be put at 0.945, and that of Manicoba at 0.966, which compares with 0.920 for *Hevea*.

ECUADOR

According to an Ecuador broadcast, the republic supplied 6,000,000 pounds of rubber to the United Nations during 1942.

Recent reports disclose a tendency for outputs to decline since the rubber areas nearest to transportation systems are becoming exhausted. Thus there was a sharp drop in rubber arrivals last July, largely due to this cause. But as new areas are being discovered and developed, rubber deliveries are expected to pick up again.

THE CLUTCH THAT CANNOT FAIL—

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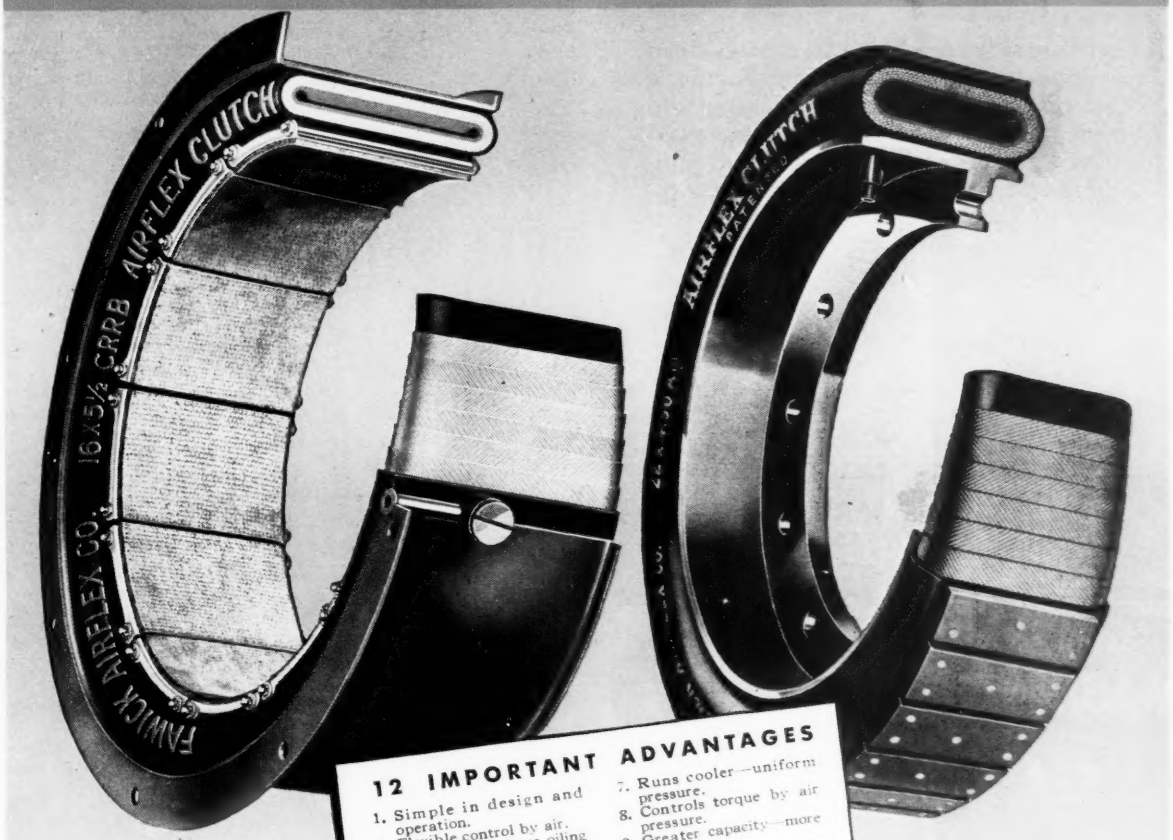

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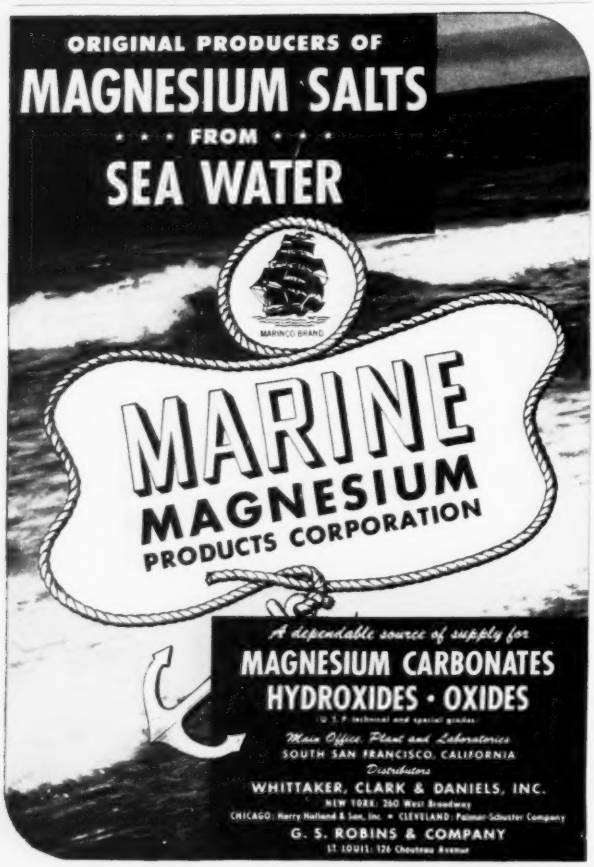

URUGUAY

Uruguay has put its rubber industry under government control. For the present all sales of raw and manufactured rubber, except old rubber, are prohibited, but tires and tubes may still be sold if certificates of necessity are obtained. Manufacturers and dealers must declare their stocks of raw rubber, old and new tires, and other rubber goods, and manufacturers must also state their consumption of raw rubber and the percentage of rubber entering the various types of articles they produce. It is planned to distribute all imports of rubber on a pro rata basis, but also in accordance with the need of the goods, among manufacturers who will have to declare the goods made from this rubber to the Director of Industries every month. Eventually certain articles will be rationed, and prices for these fixed.

COLOMBIA

Colombia is the latest American country to start its own tire-manufacturing industry and so joins the list already including Argentina, Brazil, Cuba, Peru, and Venezuela. It recently produced its first automobile tire made from home-grown rubber.

The country has built more than 5,000 miles of motor highways in recent years and has thus become increasingly dependent on motor transportation.

CHILE

Chile is attempting to solve the problem of short supplies of fuel and tires for automobiles by the increased use of bicycles. In Santiago alone, it is said, about 15,000 bicycles are now in use.

MEXICO

The Mexican Government has ordered a further reduction in the output and sales of tires and tubes for passenger automobiles to 30% (formerly 75%) of 1941 sales and at the same time has raised production of truck and bus tires by 28% (formerly 10%) against 1941 sales.

The shortage of rubber has forced the closing of two rubber factories in Mexico, thereby throwing 1,000 workers out of employment. The Mexican Government is attempting to get needed raw rubber from the United States.

Blending Guayule with GR-S

(*Continued from page 257*)

properties of the 20% GR-S-80% guayule stocks were generally poorer than those of the corresponding 80% GR-S-20% guayule stocks. In the case of guayule stocks containing certain loadings, notably zinc oxide and ultrafine whiting, a 50% substitution was required in order to make the stocks processable.

It is concluded that resiniferous guayule rubber, as now produced in Mexico, has more value for applications other than friction stocks when used in relatively small proportions as a blending agent for GR-S than when used by itself.

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EUROPE

GREAT BRITAIN

Improved Reclaiming Methods

Recent British publications disclose developments in methods of reclaiming. In "Reclaiming and the Testing of the Products"[1] John Lewis discusses reclaiming by high pressure, in which old tires are debeaded, cut into fairly large sections and subjected to steam pressure of 400 pounds per square inch. After four hours the fabric in the tire is carbonized; while the rubber is thoroughly softened and ready for working and sheeting on the mill without the need of softeners.

Mr. Lewis claims his method yields a reclaim that compares favorably with the best alkali reclaim, and the process is more economical. There is a saving of 75% in processing time; the same quantity of steel produces six times as much reclaim; 33% less labor, more than 50% less steam, and about 25% less electrical power are required. Finally, there is practically no loss in product; whereas by the older methods 1.65 to 1.75 pounds of old tires yield one pound of reclaim. An added advantage of the high-pressure method is claimed to be that by cutting the old tires in sections instead of grinding them, a smaller area is exposed to oxidation, resulting in improved aging.

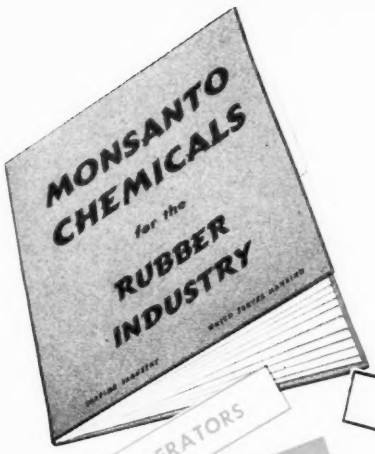
Another type of reclaim, thermodynamic reclaim, was perfected about mid-1942 by F. H. Cotton, of Northern Polytechnic Rubber Department, in cooperation with P. A. Gibbon. Before this process was developed, these investigators had studied several other methods. They had discarded high-pressure steam processes because of the difficulty of obtaining suitable autoclaves under present conditions. They finally decided to employ internal friction to heat rubber quickly to the desired temperature and were successful. The process, which involves mechanical working at high temperature, was perfected, and the Ministry of Supply was sufficiently impressed by results to permit commercial development. Now a plant exists which makes 15 to 20 tons of reclaim a week, but output could be doubled. Any type of soft vulcanized rubber waste can be readily treated by the new method, and processing from raw waste to refined reclaim rarely requires more than 60 minutes. The resultant reclaim, said to have excellent aging properties, needs no softeners to facilitate processing. However, unless additional sulphur or accelerator is incorporated in the mix, thermodynamic reclaim may be somewhat slower in cure and show lower modulus and higher elongation than other reclaims of the same waste. Furthermore the process cannot be used for small quantities. But many factories have equipment available which needs only slight modification to make it suitable for thermodynamic reclaiming.

Rubber Footwear News

A special service has been initiated by the Reconditioned Rubber Boots Order for essential war workers who can now obtain a pair of rubber boots, reconditioned, cleaned, and disinfected, two days after turning in a pair of boots fit for reconditioning, together with a permit. The reconditioned footwear, knee-length industrial rubber boots, carries the special mark XRB, and no coupons are required for them. Expected to give 75% of the wear of new boots, they retail at 18s. 8d. as compared with 29s. for similar new ones. To save transport a single firm will do all the reconditioning for the same zone.

The price of rubber footwear manufactured and distributed after September 27, 1943, is to be increased. Such footwear will bear the mark SRO 1281 to distinguish it from similar goods already stocked by wholesalers and retailers, and the increased price will apply only to goods so marked. The products manufactured or marketed by the following firms are affected: British Bata Shoe Co., Ltd., East Tilbury; Dunlop Rubber Co., Ltd., Walton; North British Rubber Co., Ltd., Edinburgh, Scotland; Pirelli, Ltd., Burton-on-Trent; C. W. Radall & Co., Ltd., Leighton Buzzard; and Waverly Rubber Co., Ltd., Edinburgh.

[1] *Trans. Inst. Rubber Ind.*, XVIII, 282 (1943).



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FLECTOL WHITE
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Fibrous Fillers

In his column, "Views and Reviews", in *The India Rubber Journal*, Philip Schidrowitz recently discussed the section on fibrous fillers of a paper on "Organic Loading Fillers Which Substitute Rubber" by Dawson, Moakes, and Newton, raising the question of the importance of the "state" or "condition" of fillers. We are well aware of the vital importance of particle size, condition of surface, and possibly particle shape, where carbon black, clay, whiting, etc., are concerned, he says, but the importance of the state of comminution of fibrous fillers, for instance, does not seem to have been generally realized. Yet the degree of grinding of cotton waste, cork, jute, etc., may make all the difference between failure and success in producing serviceable, marketable goods. This and other vital problems connected with the utilization of fibers in rubber mixings, he declares, are for the engineer to solve, further suggesting that the experience of industries outside the field of rubber might prove valuable in this regard.

The chemical and mechanical cure conditions also demand due consideration, Dr. Schidrowitz emphasizes, recalling the special curing methods required by rubber-linoleum.

British Rubber Industry Notes

The Ministry of Supply has appointed a rubber production expert, A. V. Ames, to advise on production problems in East Africa.

British Insulated Cables, Ltd., Prescot, Lancs., has introduced a new type of insulated wires known as Bicolon covered wires. Their feature is that the coverings, made from a specially developed complex organic material based on nylon, are applied in film form by a process akin to enameling. The covering material has the fine mechanical and chemical qualities of nylon in addition to the required electrical and thermal properties.

Low Temperature Carbonization, which produces Coalite smokeless fuel and coal oils, has for some months been working with the authorities on products for the plastics and synthetic rubber industries. One of the latest developments is an extender to be incorporated in synthetic rubber.

Synthetic Processes & Patents, Ltd., was recently registered with a capital of £1000 to acquire patents and inventions relating to synthetic rubber and plastics and to manufacture and deal in these materials, articles made thereof, and chemicals and solvents required in the production of synthetic rubber and plastics.

A new vulcanizer for reseating valves and repairing tubes as well as other articles has been developed by William Frost, pioneer of tire-repair vulcanizers. The latest design, known as the Ultric Model MT. Electric, is fully automatic and permits flush-vulcanizing of repairs so that the new material is incorporated in the sur-

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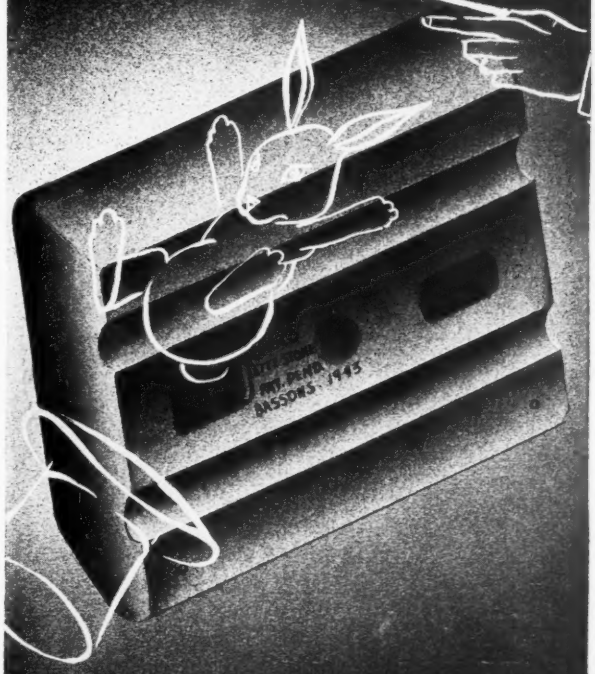

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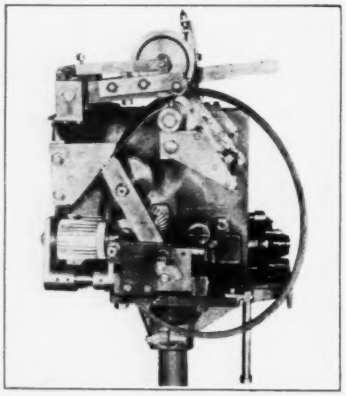

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rounding rubber and the mended spot becomes as strong as the original tube and just as elastic. The vulcanizing platen has a surface of 10⅝ inches by 6¼ inches; hence is suitable for both small and large repairs. It is being marketed by Kautex (Plastics), Ltd., Elstree Way, Elstree, Herts.

The Leicester Section of the Institution of the Rubber Industry arranged for the following meetings: October 14, "Rubber in Elongation, Compression, and Shear", by L. R. G. Treloar; December 14, "Bonding of Rubber to Metal", W. D. Rae; January 27, 1944, GR-S discussion by T. L. Garner, R. G. Fox, D. Parkinson, and W. H. Gamble; February 17, "Injection Moulding", A. E. Pallett.

RUSSIA

A peculiarity of the Russian chloroprene synthetic rubber, Sovprene, is the very pronounced set of calendered sheet as compared with that of natural or butadiene rubber. After non-loaded Sovprene mixes have been calendered, there is an increase in the thickness of the sheets which may be 100-120% to 400-500% and over, depending on the closeness of the calender rolls; while at the same time there is a reduction in the length of the sheet amounting to 80% of the original dimensions. Under similar conditions the thickness of natural or butadiene rubber sheet may increase 50-80%, and the reduction in length may amount to a few per cent. This tendency of Sovprene renders its use especially difficult for making stamped goods, where even a slight amount of "set" affects output.

Hitherto the chief means of reducing "set" has been to increase the amount of filler in the mixes, a method which obviously does not solve the problem and is only useful in the manufacture of lower-grade rubber goods for, when 40-60% of filler, on the rubber, is added to a mix, the decrease in "set" is insufficient for normal manufacturing procedure.

A series of tests were undertaken to determine the effect of temperature on the "set" of calendered Sovprene mixes, and for this purpose were used: (1) a standard, non-loaded mix; (2) a compound containing 40% factice; (3) a compound with 60% China clay and chalk; and (4) a compound containing 30% lamp black. The effect of both high and low temperature in calendering was tested. In the first instance the temperature of the rolls was as follows: top roll, 30° C.; middle roll, 35° C.; and bottom roll, 45° C. For high temperature calendering, the top roll was heated to 115° C., the middle roll to 105° C., and the bottom kept at 45° C.; the space between the rolls was 0.5 millimeters.

The thickness of the sheets was measured as well as the length in the calendering direction and across it. It was found that with high temperatures, set was considerably reduced and was three to four times less than with low temperatures. The effect of temperature on set of compounds made with factice and China clay and chalk, was much more marked than in the case of the standard and lamp-black compounds. As was to be expected, reduction of set was least in the case of the standard compounds. It was also observed that set seems to occur largely during the first 30 minutes after calendering, that there is comparatively little change in dimension after this, and that the whole process terminates in about two hours where loaded mixes are concerned.

It was attempted to find an explanation for the marked decrease in set at high temperature by testing the physico-mechanical properties of rubber calendered with the rolls at various temperatures. When samples were vulcanized in the press, similar results were obtained for all temperatures so that no conclusions could be drawn. But when the rubber was cured free, in vulcanizers, more marked differences, especially in tensile strength values, were observed. With cool rolls tensile strength, as determined along the length of the sheet, was higher than across the width, this clearly showing calender effect. All samples, whether loaded or not, showed a marked difference in tensile values for the two directions, amounting to 15-20%.

Quite different results were obtained when the rubber was calendered with hot rolls. The tensile values of the vulcanizates, determined for either direction, were approximately the same—that is, there was no calender effect.

From the above observations, it is concluded that calendering Sovprene with hot rolls neutralizes anisotropy in the properties of the rubber (calender effect), as is evidenced by the considerable decrease in the set of the compounds.

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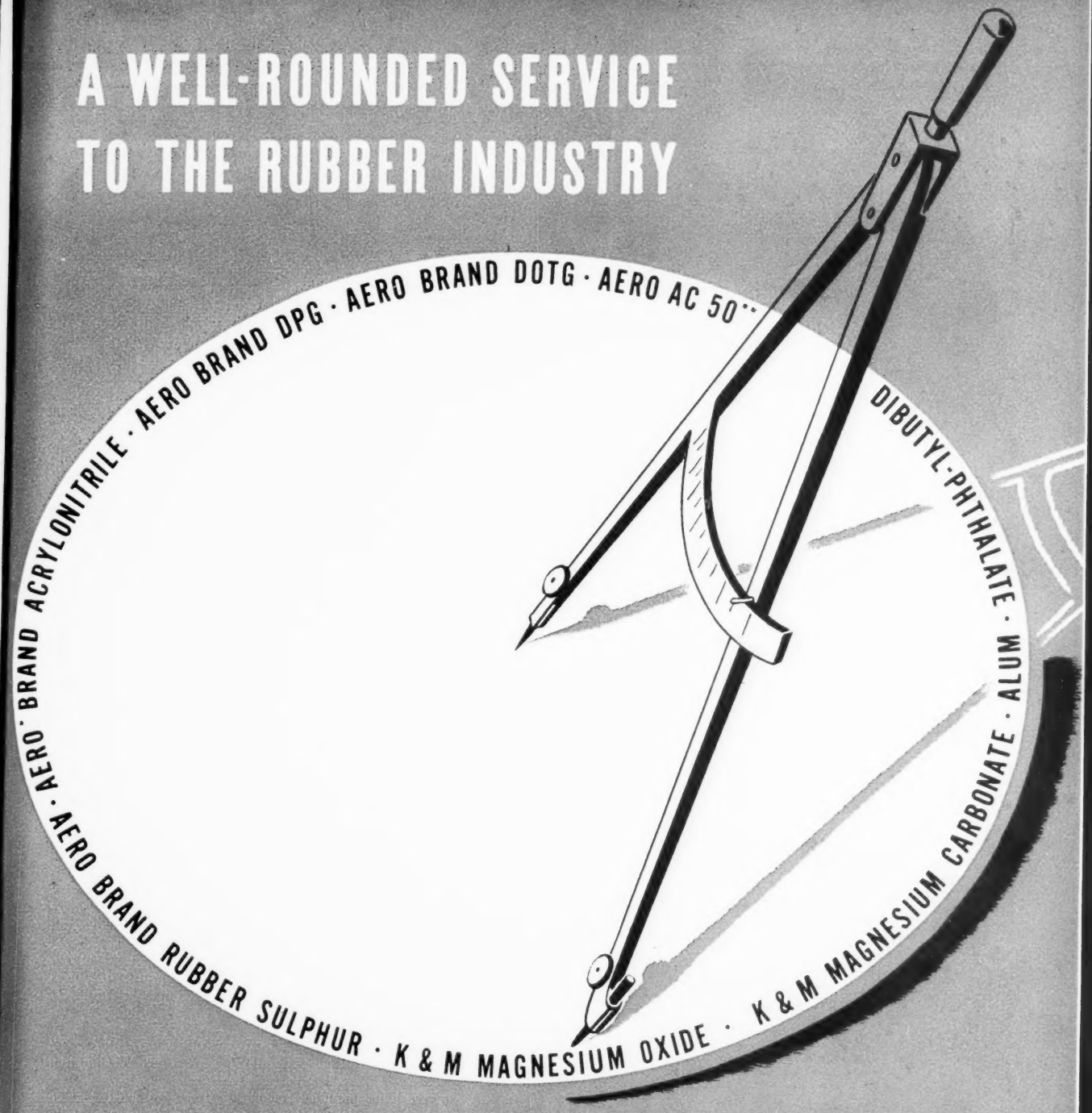
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Editor's Book Table

NEW PUBLICATIONS

"Rio Resin for Use in GR-S Products." R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8 pages. Compound formulae and physical test results are given in this bulletin to show the improvement that may be obtained in maintaining elongation and minimizing increase in hardness in some types of GR-S goods by the use of Rio Resin, a granular, resinous-like material with a melting point of about 75° C. It is recommended that the material be added after other compounding materials since, if it is added before the black, poor dispersion and poor physical properties may result.

"Naftolen for GR-S." Wilmington Chemical Corp., 10 E. 40th St., New York, N. Y. Technical Bulletin No. 3. 4 pages. This bulletin presents the fundamental principles of using Naftolen in Buna S compounds. It is pointed out that Naftolen is compatible in all proportions with Buna S and that mixtures of the two can be vulcanized to either hard or soft rubber. The use of sufficient sulphur and fillers for both the Buna S and the Naftolen is strongly emphasized, and the value of Naftolen as a processing aid for Buna S stressed. Several examples of Buna S soft and hard rubber compounds are given.

"Nervastral Dissolvable Compound." The Armstrong Rubber Co., West Haven 16, Conn. 12 pages. This booklet gives considerable information on Nervastral dissolvable compound which is reported as a new rubber substitute and a first-grade extender for the production of rubber cement and rubber dissolutions. The material, derived from high-grade rubber scrap, is plasticized on a cold mill and may be mixed with crude or synthetic rubbers and the usual compounding ingredients. Suggested uses for the new compound are in the manufacture of rubber adhesives, footwear, dipped goods, hose and cables, and in retreading operations where in all cases it may be used instead of natural rubber cement. The results of laboratory tests on blends of the dissolvable compound with smoked sheets and Buna S are given; while graphs show actual ply separation test results.

"Trade Winds." The Western Shade Cloth Co., 22nd and Jefferson Sts., Chicago 16, Ill. 16 pages. This pamphlet contains a very interesting story on the preparation and use of rubber hollands. Illustrations of rubber processing leading up to the use of the holland cloth and other illustrations of the use of holland cloth in repair and handling of rubber products are likewise included. A story entitled "Simulated Leather", having to do with the many new uses of fabrics coated with vinyl resins and other plastics, should also be of interest to the rubber industry.

"Tire Wear and Tire Failures on Various Road Surfaces." Public Roads Administration, Federal Works Agency, Washington, D. C. By R. A. Moyer, Iowa State College, Ames, Iowa. June, 1943. 44 pages. This pamphlet reports the results of an extensive investigation of passenger-car tire wear and tire failures on nine major types of road surfaces. The tests were conducted as part of a cooperative research project by the Iowa Engineering Experiment Station of Iowa State College and the Public Roads Administration to determine the effects of roadway type and condition upon motor-vehicle operating costs and to study related characteristics such as road roughness and the relative slipperiness of road surfaces. The tests were started in 1938, and reported is the wear of tires in more than 2,000,000 miles of tire travel. Many of the conclusions arrived at are not new, but having been reaffirmed as a result of this very extensive study, presented factually, and made public at this time give them added significance. It is revealed that the rate of wear of two synthetic tires exceeded the average rate for 100-level natural rubber tires by approximately 30%, and the report continues to say that while the indications of these limited tests are promising, they do not warrant definite predictions as to the mileage that may be expected from synthetic rubber tires. The pamphlet concludes with recommendations for tire conservation and highway maintenance under present-day conditions which are very pertinent at this time.

"GR-S—Guayule Blends." Continental Carbon Co., Research Laboratory, Chicago, Ill. Technical GR-S Report No. 4. 8 pages. The effect of 5%, 10%, and 20% underesinated guayule on GR-S stocks containing respectively 50 parts of Continental AA (EPC) and Continental A (MPC) carbon blacks has been determined and reported in this bulletin, which includes a graphical presentation of the results. Addition of about 5% of guayule appeared to improve tensile, resistance to heat aging, flex cracking resistance, and ease of processing. Modulus and abrasion resistance are reduced, but other properties are unchanged.

Technical Service Bulletins. Thiokol Corp., Trenton, N. J. **"The Mixing of GR-S** Compounds with and without Reclaim, Using Galex as Plasticizer." No. 14. 2 pages. Two methods of mill mixing Galex-GR-S combinations in the factory are described. Galex in GR-S compounds, with and without reclaim is recommended since it is reported that it adds a strong surface tack, which permits relatively easy fabrication of hose, belting, and general mechanical goods and gives excellent adhesion between plies after cure. **"Faster Curing GR-S-Galex Compounds."** No. 15. 2 pages. Since Galex retards the curing rate of GR-S slightly, data are presented to show the comparative effects of increased sulphur and increased acceleration in GR-S-Galex formulae.

"Fisk Synthetic Repair and Recap Manual." United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y. 20 pages. This booklet explains by word and picture every aspect of recapping, including tire repairing, tube repairing, and curing, with emphasis on the synthetic rubber materials.

"Staybelite Esters." Hercules Powder Co., Wilmington, Del. 12 pages. This booklet gives the latest data on the series of esters made from hydrogenated rosin (Staybelite). These non-oxidizing esters are described as the glycerin, mono-, di-, and tri-ethylene glycol esters of hydrogenated rosin and are finding use in formulations of adhesives based on rubber, ethyl cellulose, polyisobutylene, chlorinated rubber, and nitrocellulose. This booklet contains data on physical properties and lists typical materials compatible with Staybelite esters, including various film formers, resins, plasticizers, waxes, and asphalt. Laboratory formulations for rubber base adhesives, lacquers, and modified urea-formaldehyde resins are given. These esters have shown promise as softeners and tackifiers for rubber, reclaimed rubber, and latex; as plasticizers and modifiers for ethyl cellulose, and vinyl resins when these are used as lacquer-type coatings, plastics, adhesives, and sizes; and as binders for rock wool, glass, and cellulose fibrous insulation material.

"Felt Facts." The Felt Association, Inc., 366 Madison Ave., New York 17, N. Y. 22 pages. This booklet, which is indicated as the story of an essential material for both civilian and war use, provides information on the history, manufacture and development of various types of felts. Some results of research work are mentioned and the many new war uses such as its use after being coated with a thin film of synthetic rubber are discussed. A partial list of the military uses of felt and a list of the members of the Felt Association, Inc., completes the booklet.

"Plexiglas. Mechanical Properties." Rohm & Haas Co., Washington Sq., Philadelphia, Pa. 96 pages. This comprehensive booklet covers the mechanical properties of Plexiglas, including scratch, indentation, and abrasion resistance, rebound efficiency, and the impact, tensile, flexual, compressive, and shear strengths of the material. Effect of temperature, thickness, size, shape, conditioning, rate of straining, and other factors affecting strength are charted, and graphs included. Modulus of elasticity and cold flow or creep are other properties discussed. An appendix includes optical, electrical, and chemical properties. The test methods are described in detail so that the engineers and designers for whom this booklet is written may properly evaluate and interpret the given data.

"Postwar Employment and the Settlement of Terminated War Contracts." Committee for Economic Development, Washington, D. C. 16 pages. **"Cooling System:** Cleaning, Flushing, Rust Prevention, and Antifreeze." Society of Automotive Engineers, Inc., New York, N. Y. 26 pages. **"For Those Who Get Behind in Their Reading."** National Rubber Machinery Co., Akron 11, O. 16 pages. **"Westco Industrial Pumps."** Joshua Hendy Iron Works, Pomona Pump Co. Division, St. Louis, Mo.

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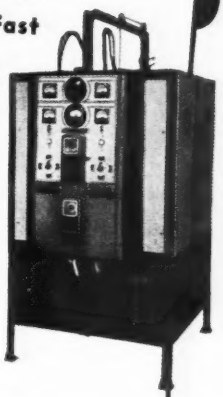

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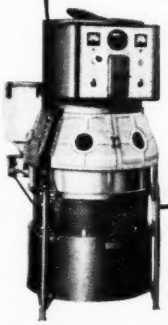

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60 pages. **"Recording Thermometers."** Bristol Co., Waterbury, Conn. 40 pages. **"From Armorubber to Armor-Piercing Bullets."** Kelly-Springfield Engineering Co., Cumberland, Md. 22 pages. **"A Yearbook of Railroad Information."** 1943 Edition. Eastern Railroad Presidents Conference Committee on Public Relations, 143 Liberty St., New York, N. Y. 96 pages. **"Wheelco Potentiotrol."** Wheelco Instruments Co., Chicago 7, Ill. 8 pages. **"Recapping and Repairing."** United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y. 16 pages.

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AFRICA

It is officially announced that the French National Committee and the British Government have renewed the agreement made in 1942 regarding the purchase of rubber from French Equatorial Africa and French Cameroon, for another year, to end June 30, 1944.

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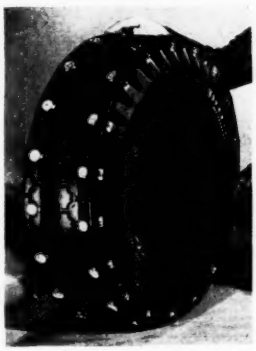
DESIGNED in cooperation with one of the country's leading corsetieres, the Saf-t-Bra is made of a durable plastic, which can be cleaned easily and is attractively colored in fleshtone. These lightweight breast protectors provide resistance to impact and are shaped anatomically to fit the curvature of the body in the area they cover and provide needed protection with day-long comfort. The Saf-t-Bra has found acceptance in war industries and in other industries where women are actually doing men's work and deserve protection from injuries which can be serious at the time of injury or many years later. Willson Products, Inc.

New Airplane Ice Tire



Steel Lugs Improve Ice Tire

REMOVABLE steel lugs are being used in the manufacture of this airplane tire to prevent skidding on ice and permit all-weather use of the tire on combat planes. The lugs fit in the high-projecting shoulders of wide-channel-tread tires. The lugs extend from the tread through the shoulders to the side of the tires, where they are bolted in place. The large and sharp steel lugs grip ice and hard-packed snow with the firmness of cleats, and in addition the tire performs excellently in soft snow, it is reported. The tires are adaptable to all-year round usage, since merely by the loosening of a few bolts, the tires may be adjusted for use on any regular landing surface. The lug-removal feature may mean that the tires will have important postwar application on private planes, whose owners enjoy winter flying, but want to invest in only one set of tires. Firestone Aircraft Co.

Life-Jacket Rescue Marker

FLUORESCEIN, a material at one time used to discover leaks in water systems, is now being used to enable searching planes to discover and rescue airmen who have been shot down in action, whether they are afloat in life rafts or floating alone in life jackets. The package of "Dye Marker", as it is officially known, is cemented

"Dye Marker" after Three Minutes' Use

Johnson's Wax Finishes for Rubber Goods

• Like so many products, Johnson's Wax Finishes for Rubber Goods have gone to war. They are available now for materials and products made specifically for war use only.

If you are a manufacturer of rubber products for war use, Johnson's Wax Finishes may very well be helpful to you. They prolong the life of rubber goods because they retard oxidation, the destroyer of rubber. Johnson's Wax Finishes for Rubber Goods are easy to apply by dipping, spraying or wiping. Coverage is good. Sizes available: 5 and 55 gallon drums.

Some day . . . and we hope it isn't too far away . . . we shall again be able to supply wax finishes to manufacturers for peacetime use on rubber goods such as automobile door gaskets, rubber hose, tubing, rubber-covered wire, refrigerator gaskets, tires, stair tread, and the like. These wax finishes not only protect by retarding oxidation, but they also add greatly to appearance value.

But for the duration, Johnson's Wax Finishes for Rubber Goods must serve Uncle Sam first.

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With an adequate testing routine in purchasing, research, production and acceptance-inspection, you anticipate and eliminate many of the unusual manufacturing difficulties of the current situation. Rely on the 60 models of *Scott Testers for tensile, hysteresis, compression-cutting, state-of-cure, flexing, adhesion, etc., etc.

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A synthetic fatty acid for the rubber industry

Specifications: Saponification No. 180-185
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Morgan and Norman Aves. Brooklyn 22, N. Y.

to the aviator's life jacket and has a rip flap, somewhat similar to the rip-cord of a parachute. When a flyer lands in the water, he waits until the rescue plane is within range before breaking the seal. The contents of the package will light up a patch of sea 40 feet in diameter, and instead of being just a surface slick easily dissipated by the waves, the path is tri-dimensional, having width, length, and depth. Life rafts also carry cans of the material. American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y.

Plastic Board Airplane Tanks

MANY deicer tanks, containing the fluid necessary to operate deicing equipment on fighter and bomber planes, are now made entirely of a plastic board. This plastic board is now also the principal material used to support bullet-sealing fuel cells in airplanes and has been chosen because of its light weight, strength, and ability to withstand gunfire over a wide temperature range without shattering. This new material is a non-conductor of electricity and will stand excessive vibration. It is not affected by gasoline, oils, aromatic blend fuels, acids, most alkalies, alcohol, and other solvents. The plastic board can be bent, cut, and formed into almost limitless shapes, and this property and others give it great promise for a wide variety of peacetime uses. United States Rubber Co., 1230 Sixth Ave., New York, N. Y.

Rubber Resins

(Continued from page 251)

As plasticizers for brittle resins and asphalts they afford a very inexpensive raw material. But again experiments must be performed to see if the rubber resin is compatible with the natural or synthetic one, as there is little information upon whether plasticizers form solid solutions or only mechanical mixtures with the resins after heating and mixing.

In one case a large shoe manufacturer purchased many tons of gutta percha resin for impregnation of threads used in sewing on soles; the object was to prevent the entrance of moisture into the shoe and to supply a flexible adhesive. Electric friction tape, which must have an ever-soft tacky surface, is coated with a compound of a bitumen, regenerated rubber, and a gutta resin and is similar in composition to readily appliable insulation pastes, which are used upon underground electric cables.

The use in ever-soft adhesives and in fly-paper are only two of the minor ones. The application of these resins to textiles in the form of an emulsion shows large possibilities as it can be emulsified with ammonium oleate or linoleate and upon drying leaves behind a film of rubber resin and the fatty acid of the emulsifier. A hardened balata resin has been used in linoleum cement. The soft resin or even the oily one can be hardened by heating for four hours at 80° C. after adding 1% of manganese resinate or one half of 1% of calcium carbonate. Treatment of the same resin with sulphur chloride results in a viscous resin which, when warm, can be pulled out into ropes like taffy candy and, when cold, is still viscous.

In closing the writer wishes to state that even though a reader may fail to find here the exact information he desires about a certain rubber resin, let it be hoped that what information he does find will save many hours of fruitless toil.

The Germans lost at least 700,000 tires when the Allies recently bombed the French Dunlop plant at Montlucon, says a Swiss paper. This amount was part of a large accumulation of stocks scheduled to be sent to Germany just one day later than that on which the raid took place.

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IMPROVES TACK
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APPLICATION

United States

2,332,132. Apparatus to Smooth the Surface of a Metal Work Piece Including a Soft Elastic Yielding Sponge Rubber Wheel Having Open Surface Pockets on Its Periphery. R. W. Dayton, Columbus, O., assignor, by mesne assignments, to Norton Co., Worcester, Mass.

2,332,172. Cooperating Casing or Cover for a Plate, Made of Soft, Flexible, Rubber-Like Material. P. Shaffer, Akron, O.

2,332,281. Nozzle for Sandblast Apparatus, Including a Liner of Hard Material Encompassed by a Rubber Sleeve. E. Van der Pyl, Holden, assignor to Norton Co., Worcester, both in Mass.

2,332,546. Kerf-Cutting Machine Frame Having Rubber-Tired Supporting Wheels. E. M. Arentzen, Charleroi, Pa., assignor, by mesne assignments, to Goodman Mfg. Co., Chicago, Ill.

2,332,754. Rubber-Tired Wheel Assembly including a Wheel Body Having Opposite Faces and an Annular Rim with a Pair of Angularly Related Peripheral Surfaces. E. L. Rietz, Riverside, Ill., assignor to International Harvester Co., a corporation of N. J.

2,332,848. Elastic Sheet Material Equally Extensible in All Directions, Including an Elastic Vulcanized Rubber Sheet and a Ply of Stretchable Textile Fabric Integrally Connected Thereto. J. A. Grabec, Bratislava, Czechoslovakia, vested in the Alien Property Custodian.

2,332,970. Shoe for the Tracks of Track-Laying Vehicles, Including a Shoe Frame Having a body of Rubber Provided with a Floating Insert. C. Sauter, Akron, and C. W. Tyler, Wickliffe, assignors to Ohio Rubber Co., Willoughby, all in O.

2,333,449. Suction Cleaner Including Suction-Creating Means and an Air Passageway Connected Thereto Having a Rigid Portion and a Muffler Which Has a Hollow Body with a Rigid Metal Tube and a Rubber Tube Telescopically Arranged. M. D. Stahl, assignors to Hoover Co., both of North Canton, O.

2,333,705. Furnishing Mechanism Including in Its Structure Two Cooperating Rotatable Members of Firm Resilient Rubber-Like Material. P. E. Cooper, assignor to Scott & Williams, both of Laconia, N. H.

2,333,800. Printing Roll Having a Core Surfaced with a Resilient, Rubber-Like Oil-Resistant Layer of Substantial Thickness. R. R. Lewis, Baldwin, and A. J. Weiss, Mineola, assignors to Vulcan Proofing Co., New York, all in N. Y.

2,333,926. Pulley for Flexible Conveyors Including a Plurality of Pulley Halves with Inwardly Directed Axially Extending Peripheral Portions and Hollow Inflatable Liner Means of Rubber-Like Material. H. W. Hajman, Detroit, Mich.

2,334,260. Vehicle Tire Having a Felly and Pairs of Arms Radiating Therefrom. W. I. Gunn, Laredo, Tex.

Dominion of Canada

415,903. Wrapper for Explosive Materials, Comprising a Fibrous Sheet-Like Material Coated with Chlorinated Rubber Lacquer. Hercules Powder Co., assignee of R. W. Lawrence, both of Wilmington, Del., U. S. A.

415,927. Fluid-Actuated Turbine of Small Diameter for Drilling Wells and the Like, Having a Bearing for the Turbine Shaft Mounted in a Stator Guide Ring and a Relatively Thin Rubber Bearing Sleeve. A. O. Smith Corp., Milwaukee, Wis., assignee of L. Yost, Los Angeles, Calif., both in the U. S. A.

416,064. Sealing Device Including a Pair of Thin Metallic Spaced Rings and a Rubber Having Its Ends Rigidly Secured to the Opposed Faces of the Rings. A. Searles, Moscow, Pa., and C. A. Swartz, Yonkers, N. Y., co-inventors.

416,077. Sand Blast Nozzle Having an Outer Jacket Formed with a Cylindrical Rear Part and a Frusto-Conical Forward Part and a Rubber Lining within the Jacket. R. O. Howard, Redding, Calif., U. S. A.

416,143. Ignition Cable Which Includes a Conductor, a Laminated Dielectric Surrounding the Conductor and Having an Innermost Layer of an Insulating Natural Rubber Composition Resistant to Ozone, and an Intermediate Layer of an Insulating Natural Rubber Composition and an Outer Layer of an Insulating Rubber Composition Both Resistant to Heat. Commercial Secretaries, Ltd., London, assignee of H. A. Tunstall, Gravesend, Kent, both in England.

416,149. Cellular Rubber Article with Surface Covered with a Layer of Heat- and Light-Resistant, Flexible Adhesive Composition and Flock Fibers Embedded in the Exposed Surface of the Adhesive Composition. Dunlop Tire & Rubber Goods Co., Ltd., assignee of W. Uffelman, both of Toronto, Ont.

416,286. Composite Contoured Carpet-Like Material Including Sheet Material Composed of One or More Layers of Rubber-Like Material. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of V. H. Bodle and G. W. Blair, co-inventors, both of Mishawaka, Ind., U. S. A.

416,287. Carpet Underlay Having Two Rubber Layers Applied to the Opposite Sides Respectively of the Fabric and Bonded together through the Fabric Interstices. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of V. H. Bodle and G. W. Blair, co-inventors, both of Mishawaka, Ind., U. S. A.

416,288. Leather-Topped Rubber Footwear. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of C. Ferrettie, Mishawaka, Ind., U. S. A.

416,301. Stiffening Member for Shoes, Having an Absorptive Base Impregnated with a Composition Including as Ingredients Rubber and a Plasticizer. Hercules Powder Co., assignee of A. L. Rummelsburg, both of Wilmington, Del., U. S. A.

416,360. Flexible Self-Sealing Pipe for Gasoline or Oil, Having a Tubular Layer of a Rubber Composition, a Vulcanizing Ingredient, and an Accelerator. W. D. Douglas, Farnborough, Hampshire, England, co-inventor, and Wilkinson Process Rubber Co., Ltd., Kuala Lumpur, Selangor, F. M. S., assignee of B. Wilkinson, London, England, co-inventor.

United Kingdom

556,517. Footwear. N. S. and D. Libstein.

PROCESS

United States

2,332,913. Forming a Substantially Continuous Layer of Plastic Material by Coating One or More of the Surfaces Presented by a Plurality of Pieces of Plastic Material with a Solution of Vulcanizable Rubber Composition in a Solvent. A. N. Iknayan, Indianapolis, Ind., assignor to United States Rubber Co., New York, N. Y.

2,333,142. Producing Cation Exchange, by Passing Water Containing Dissolved Cations from One Material in Contact with Sulphonated Rubber Containing Cations from Another Material. A. S. Behrman, Chicago, Ill., assignor to Infilco, Inc., a corporation of Del.

2,333,447. Making a Tire for Aircraft by Molding a body of Rubber-Like Material and Reenforcing Textile Material to Form a Sidewall. H. F. Schippel, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,333,699. Ribbon Formed of Separable Extruded Rubber Threads Bonded together by a Dry Deposit Formed from an Aqueous Suspension of Flocculated Talc. A. R. Brost, Providence, R. I., assignor to United States Rubber Co., New York, N. Y.

2,334,022. Continuously Laterally Stretching a Sheet of a Rubber Hydrohalide. H. D. Minich, Tarrytown, N. Y.

2,334,470. Improving the Flex-Cracking Properties of Rubber Compositions Designed for Repeated Flexing during Use. R. T. Armstrong, Radburn, N. J., assignor to United States Rubber Co., New York, N. Y.

Dominion of Canada

416,148. Permanently Tacky Adhesive Composition in the Form of a Semi-Solid Emulsion Containing Water as the Discontinuous Phase. Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of D. F. Twiss and A. E. T. Neale, co-inventors, both of Birmingham, England.

416,299. Making a Liquid Core for a Resilient Ball by Molding a Spherical Pellet, Covering It with Vulcanizable Rubber, and Simultaneously Vulvanizing the Rubber Covering and Liquefying the Core. B. F. Goodrich Co., New York, N. Y., assignee of R. A. Crawford, Akron, O., both in the U. S. A.

416,346. Rough Rubber Coating on Vapor-Permeable Fabric. United States Rubber Co., New York, N. Y., assignee of D. F. Fowler, Naugatuck, Conn., both in the U. S. A.

United Kingdom

556,022. Treating Rubber to Inhibit Cracking. United States Rubber Co.

556,281. Means for Resoling and or Reheeling Rubber Boots or the Like. J. C. and A. H. Brown.

CHEMICAL

United States

2,329,644. Preparation of a Vinyl Ester of a Lower Fatty Acid, Which Comprises Reacting Acetylene with Organic Acid in the Presence of a Catalytic Mercury Compound and Boric Acid as an Activating Substance. G. R. Owens, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,329,671. An Aralkyl Phenol Produced by Condensation of a Nuclearly Lower Alkylated Styrene with a Phenol. A. L. Ward, Drexel Hill, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,329,852. Improved Rubber Isomer Adhesive Composition Capable of Adhering Surfaces at Atmospheric Temperatures. H. J. Reid, Fairlawn, N. J., assignor to United States Rubber Co., New York, N. Y.

2,329,861. Method Which Comprises Extracting Organic Plant Toxicants from Plants Selected from the Group Consisting of Derris, Cube, Timbo, Devil's Shoe String, Pyrethrum Flowers, and Tobacco by Means of a Composite Oil Produced by Destructive Distillation of Rubber, Whereby to Produce an Insecticide. W. P. ter Horst, Packanack Lake, N. J., assignor to United States Rubber Co., New York, N. Y.

2,330,087. Thermoplastic Composition Comprising a Polymer Selected from the Group Consisting of Polyvinyl Chloride and Copolymer of Vinyl Chloride and Vinyl Acetate, a Plasticizer therefor, and a Color Stabilizer Comprising a Reaction Product of Tertiary Alkyl Urea Having from Four to Six Carbon Atoms in the Tertiary Alkyl Group and a Saturated Fatty Acid Having 12 to 18 Carbon Atoms in the Molecule. L. J. Stage, Roselle Park, and M. T. Harvey, East Orange, N. J., assignors to Harvel Research Corp., a corporation of N. J.

2,330,217. Production of a Resin Which Comprises Reacting an Alkyl Phenol Having at Least Four Carbon Atoms in the Alkyl Group and Formaldehyde in Water Solution in the Presence of a Small Amount of Acid Catalyst and of a Small Amount of Surface Active Wetting Agent at a Temperature from 180° to 210° F. J. V. Hunn, Chicago, Ill., assignor to Sherwin-Williams Co., Cleveland, O.

2,330,353. Composition Comprising a Homogeneous Mixture of a Polymeric Material in Which the Predominant Constituent Is a Vinyl Halide, and a Copolymer of a Butadiene-1,3 Hydrocarbon and an Acrylic Nitrile. D. E. Henderson, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,330,504. Aqueous Dispersion of Polyisobutylene Including Polyisobutylene, Casein, and a Solubilizing Agent for the Casein Selected from the Class Consisting of the Alkalis and Borax, the Casein Serving as the Sole Emulsifying Agent and as Protective Colloid for the Polyisobutylene Dispersion. G. P. Mack, Jackson Heights, N. Y.

2,330,527. Production of a Styrene-Type Polymerization Product by Subjecting an Admixture of Styrene with Polymers thereof to Polymerizing Conditions, in the Presence of an Ester of Crotonic Acid Having at Least Two Double Bonds in the Molecule Separated from One Another by at Least One Carbon Atom, Until Substantially Complete Polymerization Is Effected. H. P. Staudinger, Ewell, England, assignor to Distillers Co., Ltd., Edinburgh, Scotland.

2,330,698. Compounding Carbon Black into Rubber by Mixing Carbon Black with Polyisobutylene to Make a Master Batch of the Polymer and Carbon Black, and Then Mixing at Least Part of the Resulting Master Batch with Rubber. H. W. Fisher, Cranford, N. J., assignor, by mesne assignments, to Jasco, Inc., a corporation of La.

2,330,773. Steam Cylinder Lubricant Including a Major Proportion of Mineral Lubricating Oil, Polymerized Ester of an Acrylic Acid, Plus Acidless Tallow. J. C. Zimmer, Union, and A. J. Morway, Clark Township, N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,330,798. Vulcanized, Rubber-Like Plastic Composition. M. B. Chittick, Wilmette, and A. F. Schlandt, Elmhurst, assignors to Pure Oil Co., Chicago, all in Ill.

2,330,900. Composition Comprising Olefin Polymers Containing a Chemically Combined Metal and Chemically Combined Sulphur and Oxygen Obtained by Treating the Polymers with Elemental Sulphur and an Oxygen-Containing Material in the Presence of a Metal Compound Selected from the Group Consisting of Metal Oxides and Metal Hydroxides. C. M. Loane, Hammond, and J. W. Gaynor, assignors to Standard Oil Co., both of Chicago, both in Ill.

2,331,199. Rubber Compositions Containing a Large Proportion of an Acid Treated Impingement Carbon Black Carrying an Added Water Soluble Acid. R. J. King, New Canaan, and W. Mitchell, Jr., assignors to King & Lang, Inc., both of Stamford, both in Conn.

2,331,263. Making White, Pulverulent, Granular Copolymer of Styrene, Characterized by Being Substantially Insoluble and Non-Swelling in Benzene. E. C. Britton, G. H. Coleman, and J. W. Zemba, assignors to Dow Chemical Co., all of Midland, Mich.

2,331,273. Improved Resinous Composition

New

Heavy Duty 84" MILLS

for Mixing and Compounding Synthetic Rubber

WE manufacture a complete line of mills to meet every requirement of the rubber industry, from the new extra heavy duty, 84 inch production mills to 2" x 6" miniature laboratory mills. Today, as for over fifty-four years, the name Thropp symbolizes advanced engineering skill, precision workmanship and modern design. Whatever your rubber mill machinery requirements, write Thropp.

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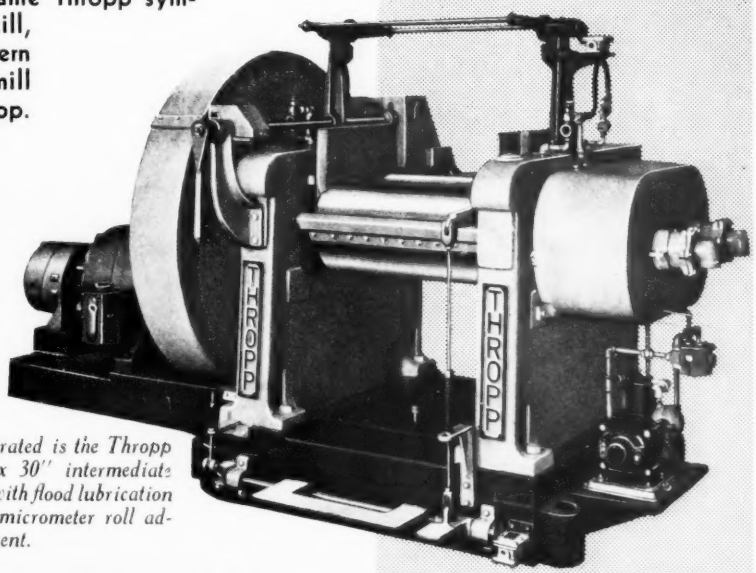
These Mills Are Equipped With Thropp Patented Mechanical or Electrical Safety Brakes

Guaranteed to meet all state labor department and insurance company standards.



Illustrated is the Thropp 14" x 30" intermediate mill with flood lubrication and micrometer roll adjustment.

WM. R. THROPP & SONS CO. TRENTON *New Jersey*

WASHERS CRACKERS REFINERS CALENDERS

Consisting Essentially of a Polymerized Vinyl Aromatic Compound. R. D. Lowry, assignor to Dow Chemical Co., both of Midland, Mich.

2,331,527. Chlorinated Rubber Hydrochloride of High Total Combined Chlorine Content. W. M. Kutz, Pittsburgh, Pa., assignor to Raolin Corp., New York, N. Y.

2,331,528. Plastic Composition Comprising a Polyvinyl Acetal Resin and an Ester of a Hydroxy-Cyclohexanone. L. P. Kyrides, Webster Groves, assignor to Monsanto Chemical Co., St. Louis, both in Mo.

2,331,519. Production of Goods of or Containing Rubber Composition from Aqueous Dispersions thereof Which Comprises Admixing the Dispersions with a Sodium Hydrofluosilicate and a Water Soluble Non-Coagulating Salt of the Group Consisting of Sodium Chloride and Potassium Chloride. D. F. Twiss, Sutton Coldfield, and P. H. Amphlett, Erdington, Birmingham, both in England, assignors to Dunlop Tire & Rubber Corp., Buffalo, N. Y.

2,331,979. Synthetic Rubber Composition Capable of Developing Tack When Brushed with an Organic Solvent, and Comprising a Rubber Copolymer Prepared by Copolymerizing in Aqueous Emulsion about 55 Parts of Butadiene-1,3 and about 45 Parts of Acrylonitrile, and from 20 to 50 Parts, Based on 100 Parts of the Copolymer, of Coal Tar. D. E. Henderson, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,331,985. Preventing Film Formation in the Production of Chlorinated Rubber Containing above 64% Fixed Chlorine, by Treating a Dilute, Substantially Anhydrous Solution of Rubber with Gaseous Chlorine at Substantially Atmospheric Pressure until Chlorinated Rubber Containing from 50 to 60 Fixed Chlorine Is Formed in the Solution. W. M. Kutz, Pittsburgh, Pa., and G. A. Webb, Akron, O., assignors to Raolin Corp., New York, N. Y.

2,332,194. Preparation of a Rubber-Like Composition Which Includes Polymerizing a Mixture of Isoolefinic and Diolefinic Material. N. S. Beekley, Jr., Westfield, and W. J. Sparks, Cranford, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,332,206. Abrasive Article Comprising Abrasive Grains United by a Bond Composed Primarily of a Resin Formed of Copolymerized Substances Comprising an Ester of an Alkyl Alcohol Having Not Over Four Carbon Atoms and an Acid Selected from the Group Consisting of Acrylic, Chloracrylic, and Methacrylic Acids Copolymerized with an Ester of the Hypothetical Ethylidene Glycol and One of the Acids. L. Coes, Jr., Brookfield, assignor to Norton Co., Worcester, both in Mass.

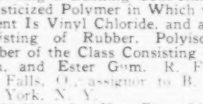
2,332,263. Imparting Tack to an Unvulcanized Synthetic Rubber Prepared by Copolymerizing in Aqueous Emulsion a Mixture of Butadiene-1,3 and Acrylonitrile. D. V. Sarbach, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,332,265. Pressure-Sensitive Adhesive Sheet Comprising a Backing Consisting Substantially of a Plasticized Polymer in Which the Principal Constituent Is Vinyl Chloride, and an Adhesive Layer Consisting of Rubber, Polyisobutylene, and a Member of the Class Consisting of Melted Rubber, Rosin, and Ester Gum. R. F. Schmidt, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,332,519. A Urea-Formaldehyde Type of Resin Product Comprising a Reaction Product Prepared by Heating to a Condensing Temperature Formaldehyde and a Solution of Casein Reacted with a Urea until a Viscous Tacky Aqueous Solution of a Resin Is Obtained; the pH of the Mixture Is Not Substantially below about 5.5. C. S. Leonardson and D. F. White, both of Seattle, Wash., assignors to Borden Co., New York, N. Y.

2,332,849. Plasticizing and Thermally Stabilizing Polyvinyl Chloride by Incorporating therein an Aliphatic Ester of Diacetoxy Stearic Acid. W. Gruber and H. Machemer, both of Burghausen, Germany; vested in the Alien Property Custodian.

2,332,869. Manufacture of an Oil-Proof Rubber-Like Material, Which Comprises Mixing Ethylene Chloride Which Has the Formula $C_2H_4Cl_2$ with the Tetrasulphide of Sodium Ethylate Which Has the Formula



and Maintaining the Mixture at a Temperature between about 70° and 150° C. until Sodium Chloride and a Rubber-Like Material Are Formed. T. Okita, Imazucho, Nishinomiya, Japan, vested in the Alien Property Custodian.

2,332,895. A Composition Comprising the Reaction Product of an Aldehyde with a Hydrolyzed, Infusible, Insoluble Copolymer of Vinyl Acetate and Dimethallyl Ether. G. F. D'Alelio, Pittsfield, Mass., assignor to General Electric Co., a corporation of New York.

2,332,974. A Copolymer of Vinyl Chloride and Vinyl Acetate. M. R. Lytton, Wilmington, and R. J. Taylor, Claymont, assignors to American Viscose Corp., Wilmington, all in Del.

2,333,214. Producing a Rubber Hydrohalide from Rubber, by Subjecting the Rubber to Intimate Contact with a Complex Addition Product of Dioxane and a Hydrogen Halide in an Amount Less Than That Required to Dissolve the Rubber Completely and in Excess of That Required to Combine with the Rubber in the Proportion of One Molecular Equivalent of Hydrogen Halide to One Molecular Equivalent of Rubber Calculated as Isoprene (C_5H_8) and Continuing the Contacting until the Product is Substantially a Rubber Monohydrohalide. C. A. Thomas and H. E. Morris, both of Dayton, O., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,333,242. Processing a Rubbery Copolymer of Butadiene-1,3 and a Lesser Amount of an Acrylic Nitrile. C. F. Fryling, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,333,280. Composition Comprising a Polymer Made from a Monomeric Material Consisting Substantially of Vinyl Chloride, a Plasticizer, and a Member of the Class Consisting of Alkali Metal Hypochlorites, Alkaline Earth Metal Hypochlorites, and Tertiary Alkyl Hypochlorites. H. Tucker, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,333,396. Molding Composition Suitable for the Production of Non-Yellowing Molded Articles, Which Comprises a Urea-Formaldehyde Resin, Cellulose Pulp, and from about 0.1% to about 0.55% of Titanium Dioxide Based on the Weight of the Cellulose Pulp. C. R. Stock, Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y.

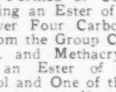
2,333,403. Plastic, Rubber-Like Interpolymer of Butadiene-1,3 and an Ester of Methacrylic Acid Made by Polymerizing Material Consisting of Butadiene-1,3 and an Ester of Methacrylic Acid in the Presence of a Member of the Group Consisting of Selenium, Tellurium, and Mixtures of These Two Elements. M. A. Youker, Gordon Heights, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,333,420. Preparing an Artificial Dispersion of Rubber by Adding Water to a Plasticized Reclaimed Rubber Mass Containing Zinc Oxide and an Ammonium Soap. D. E. Fowler, Naugatuck, Conn., assignor, by mesne assignments, to Dispersions Process, Inc., New York, N. Y.

2,333,429. Diamond Abrasive Body Comprising Diamond Abrasive Grain Bonded Initially with a B Stage Synthetic Resin of the Phenol-Aldehyde Type Cured to the C Stage. P. L. Kuzmick, Clifton, N. J., assignor to J. K. Smit & Sons, Inc., New York, N. Y.

2,333,468. Vulcanizing Rubber by Heating It and Sulphur in the Presence of a Thiocarbamyl Primary Amino Sulphide. R. H. Cooper, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

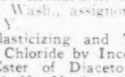
2,333,633. Polymerizing an Unsaturated Organic Compound Having the General Formula



Wherein X Represents a Substituent Selected from the Group Consisting of Hydrogen, Halogen, and Alkyl Substituents, and Y Represents a Substituent Selected from the Group Consisting of Halogen, Alkyl-Carbonyl, Alkoxy-Carbonyl, and Alkyl-Carbonyl-Oxy Substituents, and the Unsaturated Organic Compound Contains Halogen Only When X and Y Both Represent Halogen; the Steps of Forming an Aqueous Emulsion of the Unsaturated Organic Compound, Which Emulsion Also Contains as Ingredients of the Emulsion Small Proportions of a Water-Soluble Acid, a Per-Oxygen Compound, and a Ferric Compound, and Polymerizing the Unsaturated Organic Compound While in the Emulsion. E. C. Britton and W. J. Le Fevre, assignors to Dow Chemical Co., all of Midland, Mich.

2,333,634. Forming an Aqueous Emulsion of a Vinyl Halide and a Vinylidene Halide, Which Emulsion Also Contains as Ingredients thereof Small Proportions of a Water-Soluble Acid, a Per-Oxygen Compound, and a Ferric Compound, and Copolymerizing the Vinyl Halide and Vinylidene Halide While in the Emulsion. E. C. Britton, Midland, Mich., and C. W. Davis, Pittsburg, Calif., assignors to Dow Chemical Co., Midland, Mich.

2,333,635. Dissolving a Polymerizable Compound Having the General Formula



Wherein X Renresents a Substituent Selected from the Group Consisting of Hydrogen and Alkyl Substituents, and Y Represents a Substituent Selected from the Group Consisting of Nitrile, Alkyl-Carbonyl, and Alkoxy-Carbonyl Substituents, together with Minor Proportions of a Water-Soluble Acid, a Per-Oxygen Compound, and a Ferric Compound in an Inert Solvent and Polymerizing the Vinyl Compound While in the Solution. E. C. Britton and W. J. Le Fevre, assignors to Dow Chemical Co., all of Midland, Mich.

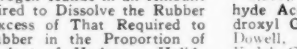
2,333,730. Coating Composition Including Essentially Phenol Rubber Product, Polymer of Isobutylene and Wax. J. A. Mitchell, Kenmore, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,333,796. Preparation of a Polyvinyl Acetaldehyde Acetal Resin Substantially Free from Hydroxyl Groups. W. O. Kenyon and W. H. M. Dowell, Rochester, N. Y., assignors to Eastman Kodak Co., Rochester, N. Y.

2,333,804. Preparation of a Pure White Polyvinyl Acetal Resin. C. J. Malm and M. Salo, assignors to Eastman Kodak Co., all of Rochester, N. Y.

2,333,810. Devulcanization of Rubber by Subjecting Whole Tire Scrap Separately to the Action of a Small Proportion of a Thiophenol and to the Action of a Dilute Aqueous Solution of Sodium Hydroxide. A. M. Neal and J. R. Schaffer, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,334,042. Vulcanizing Rubber in the Presence of an Accelerator Having the Formula

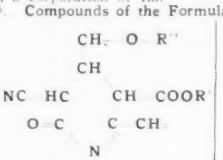


Where R Is a Radical of the Group Consisting of Thiazyls and Thiazolyls and R_1 Is an Aryl Radical. W. Scott, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,334,140. Reducing Acrylonitrile to Propionitrile by Hydrogenating a Solution of Acrylonitrile in the Presence of Raney Nickel as a Catalyst. C. F. Winans, Pittsburgh, Pa., assignor to Wingfoot Corp., Akron, O.

2,334,277. Preparation of a Heat- and Storage-Stable Chlorinated Polyisobutylene by Dissolving Polyisobutylene and Natural Rubber in a Chlorine-Resistant Solvent, and Chlorinating the Polymer and Rubber. C. F. Morrell, Elizabeth, K. Frolich, Westfield, and L. A. Bannon, Roselle, all in N. J., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

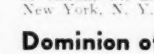
2,334,490. Compounds of the Formula



Wherein R'' Is Selected from the Group Consisting of Alkyl, Aryl, Aralkyl, and Cycloalkyl Radicals, and R' Represents Lower Alkyl. M. Hoffer, Basel, Switzerland, assignor to Hoffmann-La Roche Inc., Nutley, N. J.

2,334,585. Thin Film of Rubber Hydrohalide, a Thin Film of Cellulose Acetate Laminated thereto, a Pressure-Sensitive Adhesive Coating on One Side of the Laminated Structure and a Repellent Film on the Opposite Side. G. Schieman, Toledo, O., assignor to International Plastic Corp., Morristown, N. J.

2,334,630. Vulcanization of Rubber in the Presence of a 2-Mercaptothiazoline Salt of a Hydrocarbon Substituted Guanidine Which Has the Structure



in Which Those of the Free Valences not Occupied by Hydrocarbon Groups Are Occupied by Hydrogen. P. C. Jones and R. A. Mathes, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

Dominion of Canada

414,123. Copolymer of Vinylidene Chloride and a Compound Having the General Formula

Wherein R Is Selected from the Class Consisting of Hydrogen and the Lower Alkyl Radicals Containing from One to Five Carbon Atoms, Inclusive. Dow Chemical Co., assignee of A. W. Hanson and W. C. Goggin, co-inventors, all of Midland, Mich., U. S. A.

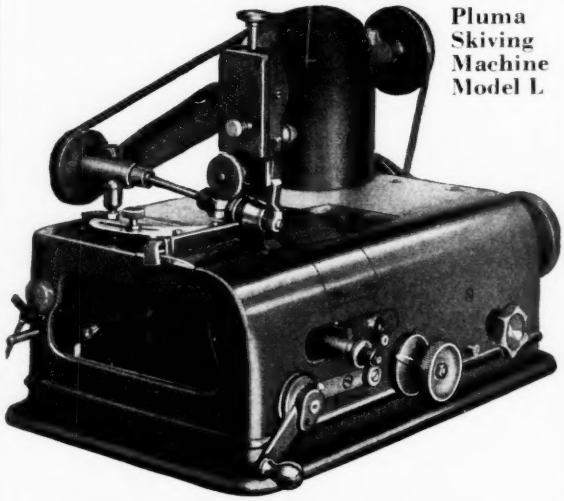
414,171. Purification of Crude Styrene Obtained from Light Oil. United Gas Improvement Co., Philadelphia, assignee of C. W. Jordan, Paoli, both in Pa., U. S. A.

414,610. Selective Polymerizing Isobutylene in the Presence of Alpha and Beta Butylenes. Shell Development Co., San Francisco, assignee of S. H. McAllister, Lafayette, both in Calif., U. S. A.

414,612. Polymerizing Normally Gaseous Olefins of Two to Five Carbon Atoms in the Presence of a Solid, Phosphoric Acid Catalyst. Shell Development Co., San Francisco, Calif., assignee of W. P. Gage, Clayton, Mo., both in the U. S. A.

415,025. Thermoplastic Composition Comprising a Major Proportion of Rubber and Wax, the Composition Containing at Least 15% of Rubber, at Least Five Parts Polyvalent Metal Soap per 100 Parts Rubber, and Wax In Amount at Least Equal to Rubber Content. Dispersions Process, Inc., New York, N. Y., assignee of J. F. Zemaitis, Waterbury, Conn., both in the U. S. A.

415,026. Adhesive Composition Comprising a Major Proportion of Rubber and Cumarone Resin, the Composition Containing at Least 15% Rub-



Pluma Skiving Machine Model L

FOR SKIVING FABRIC OR CORD TIRE PATCHES AND RELINERS

THE Pluma Skiving Machine—Model L is particularly adapted for skiving belting, rubber mats, etc., and all kinds of material used in the manufacture and reclaiming of Auto Tires.

In Rubber Shoe Factories it is used to advantage in skiving counters, also rubber soles and heels where a rolled edge is desired.

This machine is equipped with a steel feed roll especially suited for this class of work, also with a power top presser roll having a double end bearing. It has an improved gear driven grinder, which eliminates belt troubles, where water is used on the knife head parts. These features, together with a knife six inches in diameter, enable the operator to skive a uniform wide bevel scarf. It can also be fitted for a narrow scarf if desired. A water device for wetting the knife when used for skiving rubber is also provided.

UNITED SHOE MACHINERY CORP.

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Brockton, Mass.	93 Centre Street
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Cincinnati, Ohio	407 East 8th Street
Haverhill, Mass.	145 Essex Street
Harrisburg, Penna.	20 So. 4th Street
Johnson City, New York	19 Jennison Avenue
Lynn, Mass.	525 Union Street
Milwaukee, Wisconsin	922 No. Fourth Street
Nashville, Tenn.	901 Church Street
New York, New York	110 Fifth Avenue
Philadelphia, Penna.	221 No. 13th Street
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- HIGH LOADING OF PIGMENTS to
- LOWER VOLUME COSTS and
- ASSURE PROCESSING EASE with
- MAINTENANCE OF TENSILES ETC.

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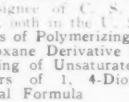
245 Fifth Avenue New York 16, N. Y.

ber, at Least Five Parts Polyvalent Metal Soap per 100 Parts Rubber, and Cumarone Resin in Amount at Least Equal to the Rubber Content. Dispersions Process, Inc., New York, N. Y., assignee of J. F. Zemaitis, Waterbury, Conn., both in the U. S. A.

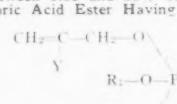
415,076. **Felt-Like Product** Formed from a Mixture of Textile Fibers and Thermoplastic Resin Fibers Formed from a Copolymer of Vinyl Compounds. Sylvania Industrial Corp., Fredericksburg, Va., assignee of C. S. Francis, Jr., Chestnut Hill, Pa., both in the U. S. A.

415,300. Process of Polymerizing a Mixture of Styrene and a Dioxane Derivative Selected from the Group Consisting of Unsaturated Esters and Unsaturated Ethers of 1, 4-Dioxaneciol-2, 3 Having the General Formula



Wherein V Represents an Unsaturated Radical Selected from the Group Consisting of Ester and Ether Radicals Containing at Least One Ethylenic Linkage. Dow Chemical Co., assignee of E. C. Britton and W. J. Le Fevre, all of Midland, Mich., U. S. A., and H. B. Marshall, Toronto, Ont., co-inventors.

415,301. Process of Heating at a Temperature between 50 and 180° C. a Mixture of Styrene with between 0.25 and 25% of Its Weight of a Phosphoric Acid Ester Having the General Formula



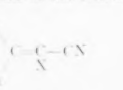
Wherein Y Represents a Substituent Selected from the Class Consisting of Alkyl Radicals and Hydrogen, and R_1 and R_2 Each Represents a Hydrocarbon Group. Dow Chemical Co., assignee of E. C. Britton and W. J. Le Fevre, all of Midland, Mich., U. S. A., and H. B. Marshall, Toronto, Ont.

415,414. Producing Synthetic Resins by Dissolving an Incompletely Polymerized Arminotriazine-Aldehyde Condensation Product in a Solvent Selected from the Group Consisting of Glycerine and Higher Fatty Acid Mono-Glycerides and Reacting the Solution with Phthalic Anhydride at Temperatures above 180° C. until a Resin of Low Acid Number Is Obtained. American Cyanamid Co., New York, N. Y., assignee of H. J. West, Riverside, Conn., both in the U. S. A.

415,523. Compounds of the General Formula

Where R Is Selected from the Group Consisting of Hydrogen and Bromine and R^1 is Selected from the Group Consisting of Hydrogen, Bromine, Alkyl, Aryl, and Aralkyl; One Bromine Atom Is Present in the Compound. Wingfoot Corp., Wilmington, Del., assignee of J. D. D'Ianni, Akron, O., both in the U. S. A.

415,524. Compounds of the General Formula



Where X Is Selected from the Group Consisting of Hydrogen, Halogen, Alkyl, Haloalkyl, Aryl, Aralkyl, Alkoxy, and Alicyclic Radicals, R Is Halogen, and R_1 Is Selected from the Group Consisting of Hydrogen and Halogen; Not More Than Two Halogen Groups Are Present on the Alpha and Beta Carbon Atoms Taken together. Wingfoot Corp., Wilmington, Del., assignee of A. M. Clifford and J. G. Lichty, both of Stow, O., both in the U. S. A.

416,093. Coloring Composition Comprising a Colored Aqueous Emulsion of a Water-Insoluble Synthetic Resinous Composition Containing a Substance Included in the Group Consisting of Oxidizable Emulsifying Agents, Heat Convertible Emulsifying Agents, and Emulsifying Agents Which Yield Insoluble Residues on Heating or Curing. American Cyanamid Co., New York, N. Y., assignee of R. H. Kienle, Bound Brook, N. J., both in the U. S. A.

United Kingdom

555,082. **Plasticized Resinous Compositions.** J. G. Fife, (Shell Development Co.).

555,233. **Antioxidants.** United States Rubber Co.

555,314. **4, 4¹ Derivatives of 2-Carboxydiphenyl Sulphones and Esters.** American Cyanamid Co.

555,569. **Polymeric Materials.** American Cyanamid Co.

555,858. **Rubber Substitute.** S. N. Brown.

555,907. **Rubber Hydrochloride Film.** Wingfoot Corp.

UNCLASSIFIED

United States

2,325,690. **Driving Apparatus for Crawler-Type Vehicles.** C. W. Leguillon, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,325,848. **Tire Carrier.** C. W. Gildea and J. A. Hausmann, Fort Wayne, Ind., assignors to International Harvester Co., a corporation of N. J.

2,326,100. **Wire Terminal.** F. C. Lavarack, Montclair, N. J., and E. M. Deems, Forest Hills, assignors to Railroad Accessories Corp., New York, both in N. Y.

2,326,618. **Tire Chain Assembly.** E. W. Carlson and C. H. Bramard, both of Omaha, Neb.

2,328,522. **Rubber Band Dispenser.** P. A. Yocum, Barberton, O.

2,328,680. **Tire Chain Tool.** W. R. Royer, Wilkes-Barre, Pa.

2,332,113. **Antiskid Tire Chain.** J. O. Reed, Washington, D. C.

2,332,621. **Valve.** E. F. Brunner, Silver Lake, assignor to Wingfoot Corp., Akron, both in O.

2,333,356. **Antitheft Automobile Wheel and Tire Locking Device.** O. J. Blanchet, New Bedford, Mass.

2,333,880. **Tire Tool.** H. C. Ohlsen, Dubuque, Iowa.

2,333,947. **Solid Tire Cushion Wheel.** P. Murphy, New York, N. Y.

2,334,095. **Signaling Device for Pneumatic Tires.** M. A. Hoghaug, Mahnomen, Minn.

2,334,443. **Tire Pressure Indicator.** E. F. Schabert, assignor to Automatic Air Gauge, Inc., both of Keenesburg, Colo.

Dominion of Canada

414,272. **Centrifugal Separator Bowl Disk Liner.** De Laval Separator Co., New York, N. Y., U. S. A., assignee of E. A. Forsberg, Nockey, Sweden.

414,274. **Fluid Pressure Brake for Aircraft.** Dunlop Rubber Co., Ltd., London, assignee of G. E. Beharrell, J. Wright, and H. Trevaskis, all of Fort Dunlop, Erdington, Birmingham, all in England.

414,297. **Tape Dispensing Device.** Johnson & Johnson, Ltd., Montreal, P. Q., assignee of F. X. Montbach, Highland Park, N. J., U. S. A.

414,346. **Fastener Slider.** United States Rubber Co., New York, assignee of W. R. Epes, Forest Hills, both in N. Y., U. S. A.

416,116. **Plied Cord Structure for Reenforcing Rubber Structures.** Canadian Industries, Ltd., Montreal, P. Q., assignee of H. H. Parker, Kenmore, N. Y., U. S. A.

United Kingdom

553,437. **Coatings for Rubber Articles.** Imperial Chemical Industries, Ltd. (E. I. du Pont de Nemours & Co.).

554,351. **Joints for Electric Conductors.** British Insulated Cables, Ltd., J. Conning, T. Cain.

554,670. **Forms for Deposited Rubber Articles.** A. N. Spanel.

554,961. **Bead Locks for Wheel Tires.** Firestone Tire & Rubber Co.

555,674. **Joints between Rubber Sheets or Tiles.** Redfern's Rubber Works, Ltd., and F. E. Brown.

555,754. **Means for Maintaining a Tire in Correct Position upon a Wheel Rim.** Firestone Tire & Rubber Co., Ltd., S. J. Breeze, Toledo Woodhead Springs, Ltd., and F. Woodhead.

556,391. **Wheel Construction.** Firestone Tire & Rubber Co.

TRADE MARKS

United States

403,741. **Plastamine.** Synthetic resins. Sharples Chemicals, Inc., Philadelphia, Pa.

403,774. **Plioflex.** Polyvinyl vinylidene chloride in sheet form. Goodyear Tire & Rubber Co., Akron, O.

403,816. **Colpro.** Reclaimed rubber. Firestone Tire & Rubber Co., Akron, O.

403,839. **Pycal.** Plasticizing, dispersing, and wetting agents. Atlas Powder Co., Wilmington, Del.

403,946. **Uskon.** Rubber sheet with electrical conducting property. United States Rubber Co., New York, N. Y.

404,287. **Velva-Tone.** Rubber and fabric printers' supplies. Goodyear Tire & Rubber Co., Akron, O.

404,289. **Kuron.** Elastic fabric. United States Rubber Co., New York, N. Y.

Compounding Ingredients Price Changes

Atomite	*ton*	$27.50	/
Hycar OR-15	*lb.*	.56	$0.72
25	*lb.*	.50	.66
OS-10	*lb.*	.50	.69
Kaolloid Clay	*ton*	9.00	/
Keystone White	*ton*	14.00	/
Naftolen R-100	*lb.*	.10	.12
Perbunan 26	*lb.*	.53	/
Snowflake White	*ton*	16.00	/

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Chicle Co.	Com.	$0.50 extra	Dec. 15	Dec. 1
American Chicle Co.	Com.	1.00 q.	Dec. 15	Dec. 1
Armstrong Rubber Co.	A & B	1.00	Dec. 1	Nov. 15
Belden Mfg. Co.	Com.	0.375 q.	Nov. 30	Nov. 17
Boston Woven Hose & Rubber Co.	Com.	0.50 q.	Nov. 26	Nov. 15
Canada Wire & Cable Co., Ltd.	"B"	0.25 q.	Dec. 15	Nov. 30
Canada Wire & Cable Co., Ltd.	"A"	1.00 a.	Dec. 15	Nov. 30
Canada Wire & Cable Co., Ltd.	6½% Pfd.	1.625 q.	Dec. 15	Nov. 30
Crown Cork & Seal Co.	Com.	0.50 yr. end	Dec. 6	Nov. 19
Crown Cork & Seal Co.	$2.25 Pfd.	0.565	Dec. 15	Nov. 30
E. I. du Pont de Nemours & Co., Inc.	Com.	1.25	Dec. 14	Dec. 22
E. I. du Pont de Nemours & Co., Inc.	$4.50 Pfd.	1.125 q.	Jan. 25	Nov. 15
Detroit Gasket & Mfg. Co.	6% Cum. Pfd.	0.30 q.	Dec. 1	Nov. 13
Faultless Rubber Co.	Com.	0.50	Jan. 1	Dec. 15
Firestone Tire & Rubber Co.	6% Cum. Pfd. A	1.50 q.	Dec. 1	Nov. 15
Firestone Tire & Rubber Co.	Pfd.	1.50 q.	Dec. 1	Nov. 15
Firestone Tire & Rubber Co.	Com.	0.50 yr. end	Dec. 10	Nov. 30
B. F. Goodrich Co.	Com.	1.00 yr. end	Dec. 10	Nov. 30
B. F. Goodrich Co.	Pfd.	1.25 q.	Dec. 31	Dec. 15
Goodyear Tire & Rubber Co.	Com.	0.50	Dec. 15	Nov. 15
Goodyear Tire & Rubber Co.	Pfd.	1.25 q.	Dec. 15	Nov. 15
I. B. Kleinert Rubber Co.	Com.	0.30 yr. end	Dec. 12	Dec. 1
Norwalk Tire & Rubber Co.	Pfd.	0.875 q.	Jan. 3	Dec. 15
Okonite Co.	Com.	1.50 q.	Nov. 1	Oct. 18
Okonite Co.	Com.	0.50 extra	Nov. 1	Oct. 18
Okonite Co.	6% Pfd.	1.50 q.	Dec. 1	Nov. 17
Phelps Dodge Copper Corp.	Com.	0.40	Dec. 10	Nov. 25
Raybestos-Manhattan, Inc.	Com.	0.375 q.	Sept. 15	Aug. 31
Raybestos-Manhattan, Inc.	Com.	1.00	Dec. 15	Nov. 30
Seiberling Rubber Co.	Pfd.	0.63 q.	Oct. 1	Sept. 15
Seiberling Rubber Co.	Pfd. A	1.25 q.	Oct. 1	Sept 15
Seiberling Rubber Co.	Pr. Pfd.	0.62 q.	Jan. 1	Dec. 15
Seiberling Rubber Co.	A	1.25 q.	Jan. 1	Dec. 15
Tyer Rubber Co.	Com.	0.50	Nov. 15	Nov. 5
Tyer Rubber Co.	6% Pfd.	1.50 q.	Nov. 15	Nov. 5
United Elastic Corp.	Com.	0.35	Dec. 10	Nov. 20
United States Rubber Co.	Com.	0.50 yr. end	Dec. 17	Dec. 3
United States Rubber Co.	8% Pfd.	2.00	Dec. 17	Dec. 3
U. S. Rubber Reclaiming Co., Inc.	Pfd.	0.50 accum.	Oct. 11	Oct. 5
S. S. White Dental Mfg. Co.	Com.	0.30	Oct. 29	Nov. 1

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VULCANIZED VEGETABLE OILS

— RUBBER SUBSTITUTES —

A LONG ESTABLISHED AND PROVEN PRODUCT

THE CARTER BELL MFG. CO. SINCE 1903 CARTER BELL PRODUCTS SPRINGFIELD, NEW JERSEY

Regular and Special Constructions of

COTTON FABRICS

Single Filling **Double Filling**

and

ARMY

Ducks

HOSE and BELTING

Ducks

Drills

Selected

Osnaburgs

Curran & Barry

320 BROADWAY

NEW YORK

Market Reviews

COTTON & FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

	Sept. 25	Oct. 30	Nov. 6	Nov. 13	Nov. 20	Nov. 27
Futures						
Dec.	20.09	20.07	19.78	19.80	19.85	19.29
Jan.	20.01	20.02	19.73	19.74	19.71	19.25
Mar.	19.92	19.90	19.57	19.54	19.50	19.16
July	19.51	19.52	19.13	19.02	19.20	18.82
Oct.			19.22	18.84	18.70	18.37

NOVEMBER cotton reflected a lukewarm market. Only Congressional perseverance in balking at subsidies keeps higher-price interests in a buying mood. They point out that cotton is particularly vulnerable to favorable war news since a large part of the crop has been withheld at the source by producers who hope for sky-high returns notwithstanding a substantial movement of the 1943 crop cotton into the government loan. Desire to buy was squelched further by reports that the recent Spanish inquiry for 85,000 to 90,000 bales of American cotton had been cancelled, together with the official report on domestic cotton consumption during October which showed a slightly lower use of the staple during that month than had been expected.

The Bureau of the Census reported consumption of all cottons in this country in October totaled 847,000 bales, against 872,000 in September and 973,000 in October, 1942. Also the Bureau reported that cotton of this year's growth ginned to November 14 totaled 9,930,593 running bales, counting round as half bales and excluding linters. This compares with 10,676,552 bales a year ago and 8,808,276 bales two years ago. The New York Cotton Exchange Service Bureau, in a report issued prior to the official announcement, had estimated October consumption at 855,000 bales. Current ideas in both trade and official circles are that the total amount of cotton which will be used by the domestic spinning industry during the full present season will be approximately 10,000,000 bales, or about 1,100,000 bales less than was consumed last season, and 1,170,000 less than two seasons ago, when consumption of the staple in this country attained an all-time high.

Commodity Credit Corp. revealed that for the week ended November 13 loans were made on 1,523,235 bales of 1943 crop cotton compared with 794,830 bales at the same time last year. Entries through the week of November 13 totaled 204,468 bales, against 107,304 bales for the 1942 week.

The price of 15/16-inch spot middling grade dropped from 20.72c on November 1 to 20.44c on November 3, rose to 20.52c on November 4, declined to 20.11c on November 8, climbed back to 20.28c on the ninth, receded the next day to 20.20c, then continued on the upgrade to 20.53c on November 18, only to slip again to 20.36c on November 22, and closed at 20.09c on December 2.

Fabrics

The Carded Yarn Industry Advisory Committee met with officials of the WPB Textile, Clothing and Leather Division, and the belief was expressed by the former that the recent downward trend in cotton carded yarn production has been checked and that the prospects are for an improvement in production in the coming months. Members stated, however, that better production is contingent on stabilization of manpower. They suggested that deferred agricultural workers, particularly those experienced in textile industries, be permitted to work during off-seasons in spinning plants.

A steady increase is indicated in shipments of high-tenacity rayon yarns, for use in the manufacture of tire cords. Tire manufacturers, though, are reported to be pressing for more deliveries of these yarns to be used in combination with synthetic rubber. Meanwhile rayon yarn goods stocks in retailers' hands are nearing "the danger mark." For some months they have been selling at a swifter pace than they have been able to replace, with the situation in this regard steadily becoming worse.

Raincoat manufacturers will buy practically any type of material suitable for raincoats today and in whatever quantities are offered. Price is immaterial. This is due to the cloth monopoly held by the Army and Navy for raincoats and ponchos.

(Owing to the need of paper conservation and the fact that prices generally are frozen, the New York quotations of fabrics will be given only every other month.)

Rims Approved and Branded by The Tire & Rim Assn., Inc.

Rim Size	Oct., 1943
15" & 16" D. C. Passenger	
16x4.00E	26,975
16x4.25E	8,099
16x4.50E	18,199
15x5.00E	510
15x5.50F	940
16x5.50F	3,295
17" & Over Passenger	
18x2.15B	12,400
Military	
16x4.50CE	98,128
16x6.50CS	49,332
20x4.50CR	3,465
20x6.00CT	21,685
18x8.00CV	3,851
20x10.00CW	1,129
24x10.00CW	1,561
Flat Base Truck	
20x3.75P (15")	1,158
20x4.33R (6")	33,388
15x5.00S (7")	2,541
18x5.00S (7")	2,544
20x5.00S (7")	319,053
24x5.00S (7")	2,002
20x6.00T (8")	38,390
22x6.00T (8")	1,314
20x7.33V (9-10")	34,851
22x7.33V (9-10")	503
24x7.33V (9-10")	5,677
20x8.37V (11")	744
24x8.37V (11")	985
Semi D. C. Truck	
16x5.50F	6,938
Tractor & Implement	
12x3.00D	2,414
19x3.00D	11,895
36x6.00S	1,247
24x8.00T	6,208
28x8.00T	1,135
36x8.00T	419
W8-24	11,205
W9-24	129
W9-36	573
W9-38	2,480
W9-40	89
W10-28	1,266
W10-38	1,809
W11-24	13
DW9-38	1,379
DW10-38	2,190
DW12-30	1,962
Cast	
24x15.00	57
TOTAL	745,927

Fixed Government Prices*

Balata	Price per Pound: Civilian Use	Price per Pound: Other Than Civilian Use
Manaos Block	$0.38¾	$0.38¾
Swinam Sheet	.42½	.42½
Guayule		
Guayule (*carload lots*)	.17½	.31
Latex		
Normal (*tank car lots*)	.26	.43½
Creamed (*tank car lots*)	.26¾	.44¼
Centrifuged (*tank car lots*)	.27¾	.45¼
Heat-Concentrated (*carload drums*)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22⅛	40
1X Thin Pale Latex Crepe	.22½	40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅜	.38⅞
2X Brown Crepe	.21⅛	.38⅝
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅝
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.15½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26⅛
(washed and dried)	.20¼	.37⅝
Islands Fine (crude)	.14⅝	.28¼
(washed and dried)	.22½	40
Caucho Ball (crude)	.11⅝	.24¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	.35½

*For a complete list of all grades of all rubbers, including crude, balata, guayule, synthetic, and latex, see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

Scrap Rubber Ceilings

Inner Tubes†	¢ per Lb.
No. 2 passenger tubes	7¾
Red passenger tubes	7½
Passenger tubes	6

Tires‡	$ per Short Ton
Mixed passenger tires	20.00
Beadless passenger tires	26.00
Solid tires	36.00

Peelings†	
No. 1 peelings	47.50
No. 2 peelings	47.50
No. 1 light colored (zinc) carcass	52.50

Miscellaneous Items‡	
Air brake hose	25.00
Miscellaneous hose	17.00
Rubber boots and shoes	33.00
Black mechanical scrap above 1.15 sp. gr.	20.00
General household and industrial scrap	15.00

† All consuming centers except Los Angeles.
‡ Akron only.
‡ All consuming centers.

Reclaimed Rubber Prices

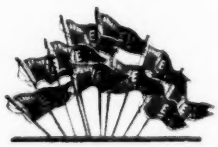
Auto Tire	Sp. Grav.	¢ per Lb.
Black Select	1.16–1.18	6½ / 6¾
Acid	1.18–1.22	7½ / 7¾
Shoe		
Standard	1.56–1.60	7 / 7¼
Tubes		
Black	1.14–1.26	11¼ / 11½
Gray	1.15–1.26	12½ / 13¼
Red	1.15–1.32	12 / 12¼
Miscellaneous		
Mechanical blends	1.25–1.50	4½ / 5½
White	1.35–1.50	13½ / 14½

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

COTTON GOES TO WAR

"Chow time" calls for cotton—just as every other moment in the military and naval schedule commands this versatile fabric. In Duck for truck tarpaulins, fabrics for cooks' aprons, nurses' uniforms, towels, and scores of other needs . . . cotton is constantly helping to fight this war. It goes into action 24 hours a day.

Because cotton fabrics are so important in the war, supplies of our SHAWMUT HOSE and BELTING DUCK, single and plied yarn Chafers are available only to those customers meeting conditions of general preference order M-91 as amended.



It is a cause for gratification to us that ten of the mills we represent have been awarded the Army-Navy "E".

SHAWMUT MILL	EQUINOX MILL
LANGDALE MILL	BROOKSIDE MILLS
LANETT MILL	THE DIXIE COTTON MILLS
FAIRFAX MILL	PIEDMONT COTTON MILLS
RIVERDALE MILL	PALMETTO COTTON MILLS

BUY MORE WAR BONDS

WELLINGTON SEARS COMPANY

65 Worth Street, New York 13, N. Y.

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ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

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Light face type $1.00 per line (ten words)
Bold face type $1.25 per line (eight words)
Allow nine words for keyed address.

SITUATIONS WANTED RATES
Light face type 40c per line (ten words)
Bold face type 55c per line (eight words)
Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.

SITUATIONS OPEN RATES
Light face type 75c per line (ten words)
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Replies forwarded without charge

SITUATIONS OPEN

CHEMIST AND FACTORY SUPERINTENDENT TO take charge of Small Rubber Factory in Chicago Area. Excellent opportunity. Address Box No. 703, care of INDIA RUBBER WORLD.

TIRE AND TUBE DEVELOPMENT, PROCESS OR construction engineers—Location outside Ohio. Address Box No. 704, care of INDIA RUBBER WORLD.

TIME STUDY AND MOTION ANALYSIS MEN— must have several years' experience with progressive company. Furnish complete history in first letter. Location away from Ohio. Address Box No. 705, care of INDIA RUBBER WORLD.

CHEMIST—THOROUGHLY EXPERIENCED IN COMPOUNDING and processing rubber and synthetic rubbers. Knowledge of calendering and spreading desirable. Eastern location; permanent opportunity. Give full details first letter. Address Box No. 706, care of INDIA RUBBER WORLD.

RUBBER TANK LINING MAN TO TAKE CHARGE OF SMALL midwestern exclusive tank lining and roll covering plant. Excellent opportunity. Unlimited future. Address Box No. 707, care of INDIA RUBBER WORLD.

CHEMIST, EXPERIENCED IN DEVELOPMENT and control of synthetic rubber compounds. Good postwar prospects with small organization. Give full particulars and salary desired. Address Box No. 710, care of INDIA RUBBER WORLD.

CALENDER OPERATOR: Experienced, Brooklyn rubber plant now war production. Job is permanent. Essential workers must have proper release. Address Box No. 716, care of INDIA RUBBER WORLD.

SITUATIONS OPEN (Continued)

WANTED: CHIEF CHEMIST WITH WIDE AND varied experience to manage large rubber and plastics laboratory. Excellent opportunity. State qualifications. Address Box 712, care of INDIA RUBBER WORLD.

DEVELOPMENT WORK. A LEADING MANUFACTURER HAS AN opening for a young man with 3 to 6 years' experience in rubber, plastics, resins or coating problems, to direct development work. This is an attractive, permanent position and represents an excellent opportunity for an intelligent, alert man. Send complete details with expected salary to Box No. 714, care of INDIA RUBBER WORLD.

TWO CHEMICAL ENGINEERS. Between 28 and 50. One experienced in EXTRUSION OF NATURAL AND SYNTHETIC RUBBER. Other in TIRE DEVELOPMENT. Permanent, essential jobs. Midwestern rubber company with outstanding record of consistent growth and progressive planning. National and international business. Now developing postwar expansion program. State experience, education, salary requirements, etc. All inquiries will be acknowledged. Address Box No. 717, care of INDIA RUBBER WORLD.

CHEMIST EXPERIENCED IN NATURAL AND SYN- thetic rubber and pyroxylin compounding. Write for interview to Box No. 718, care of INDIA RUBBER WORLD.

A SMALL AND GROWING NORTHERN OHIO RUBBER COMPANY wants an experienced man to install and develop an effective technical department. Must be a graduate chemist or chemical engineer with organization ability, also a sound background of experience and accomplishment in compound, process and product development and control methods applying to mechanical molded products. An unusual opportunity for a competent result-getter to determine a most desirable future. Reply with full particulars of personal status, qualifications, and salary requirements. Address Box No. 721, care of INDIA RUBBER WORLD.

MECHANICAL ENGINEER

Connecticut Manufacturer seeking man with background in Rubber or Allied Industry to assist plant Engineer in Mechanical Development and Lay-Out. Post-War Security assured. Opportunity for advancement. Give complete information concerning previous experience, personal history, and salary range you would consider.

ADDRESS BOX NO. 720
Care of INDIA RUBBER WORLD

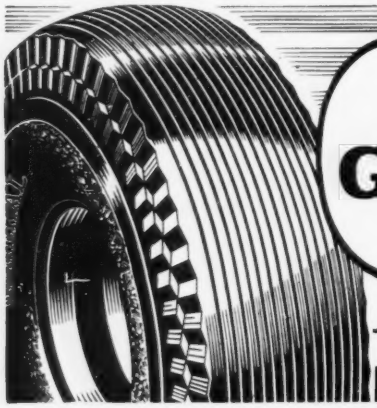
(Hiring done in accordance with WMC Regulations)

WILBURN F. BERNSTEIN

Formerly Chief Chemical Engineer of Victor Mfg. & Gasket Co.
ANNOUNCES THE OPENING OF
CONSULTANT ENGINEERING OFFICES
ONE NORTH LA SALLE
CHICAGO 2, ILLINOIS CENTRAL 3491

INTERNATIONAL PULP CO.

41 Park Row, NEW YORK, N. Y.
SOLE PRODUCERS
ASBESTINE
REG. U. S. PAT. OFF.



The **GENERAL TIRE**

Factory Control **KRAFT SYSTEM TIRE RENEWING**

–goes a long way to make friends

LOOK for this emblem on tires recapped by the Kraft System

KRAFT SYSTEM KRAFTRED TIRE RENEWING

TRADE MARK REG. U. S. PAT. OFF.

THE GENERAL TIRE & RUBBER COMPANY • AKRON, OHIO

(Classified Advertisements Continued on Page 318)

FLEXO JOINTS

—the outstanding swing joint; trouble free—long service.

FLEXO SUPPLY COMPANY
4218 Olive Street ST. LOUIS, MO.
Complete bulletin on request.

Stamford Neophax Vulcanized Oil

(Reg. U. S. Pat. Off.)

For Use with Neoprene

THE STAMFORD RUBBER SUPPLY CO. STAMFORD CONN.

Makers of Stamford "Factice" Vulcanized Oil
(Reg. U. S. Pat. Off.)
SINCE 1900

QUALITY **INTEGRITY** **SERVICE**
62 YEARS WITHOUT REORGANIZATION

BELTING
Transmission—Conveyor—Elevator

HOSE
for every purpose
Water—Fire—Air—Steam

HOME RUBBER CO. TRENTON, N. J. STEAM NEVER BURN BLOW OUT. PACKING. CHICAGO NEW YORK

PACKING
Sheet & Rod Packings
for every condition

Mechanical Specialties of Every Description

HOME RUBBER COMPANY
Factory & Main Office
TRENTON 5, N. J.

LONDON: 107 Clifton St., Finsbury CHICAGO: 168 North Clinton St. NEW YORK: 80-82 Reade St.

AMCO ESTABLISHED 1892

THE WORLD'S FINEST RUBBER AND PLASTIC MACHINERY

The ADAMSON MACHINE Co.

AKRON, OHIO . . . U. S. A.

Adamson mixing and molding equipment is built to meet modern production demands for greater accuracy at lower costs. What's your machine problem? A card will bring full particulars. Write today!

An International Standard of Measurement for

Hardness ● Elasticity

Plasticity of Rubber, etc.

Is the DUROMETER and ELASTOMETER (23rd year)

These are all factors vital in the selection of raw material and the control of your processes to attain the required modern Standards of Quality in the Finished Product. Universally adopted.

It is economic extravagance to be without these instruments. Used free handed in any position or on Bench Stands, convenient, instant registrations, fool proof.

Ask for our Descriptive Bulletins and Price List R-4 and R-5.

THE SHORE INSTRUMENT & MFG. CO.
Van Wyck Avenue and Carll Street, JAMAICA, NEW YORK
Agents in all foreign countries.

Classified Advertisements

Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.

Continued

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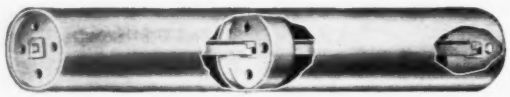
COMPOUNDER-ENGINEER. EXPERIENCED IN COMPOUNDING and manufacture of mechanicals, tubes, pneumatic and solid tires, natural and synthetic rubber. Trained in production management by large company. Chemical Engineering Degree. California location desired because of children's health. Address Box No. 711, care of INDIA RUBBER WORLD.

FACTORY SUPERINTENDENT, 25 YEARS' EXPERIENCE, DESIRES situation with small rubber plant in New York area. Qualified to handle efficiently production problems, costs, compounding and development work with all types of synthetics; molded, extruded and sponge. Address Box No. 719, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

NEW AND BETTER GAMMETER'S
ALL STEEL ALL WELDED CALENDER STOCK SHELL



4" 5" 6" 8" 10" 12" diameters, any length.
Besides our well known Standard and Heavy Duty Constructions, we can supply light weight drums made up to suit your needs.
THE W. F. GAMMETER COMPANY
CADIZ, OHIO

POST-WAR OPPORTUNITY

Midwestern manufacturer, now engaged largely in war production, has large rubber coating and spreading capacity available for volume production of Post-War items. Interested in any commercial or industrial article, specialty or staple merchandise, coated with natural or synthetic rubbers or plastic materials, on either fabrics or paper.

Have well-equipped research laboratory which can be utilized for joint development of new ideas.

Also interested in procuring proofing work now for available open spreading equipment.

Address Box No. 702, care of INDIA RUBBER WORLD

CONTINENTAL-MEXICAN RUBBER CO., Inc.
745 Fifth Ave., New York City

Producer in Mexico of

GUAYULE RUBBER

Washed—AMPAR BRAND—Dried

Formerly Distributed By
CONTINENTAL RUBBER COMPANY OF NEW YORK
An Affiliated Company

RUBBER FACTORY is in a position to take on any kind of mill work.
ADDRESS BOX NO. 715, care of INDIA RUBBER WORLD

SINCE 1880 RUBBER GOODS
"They Last Longer" REG. U. S. PAT. OFF.
Rand REG. U. S. PAT. OFF.

DRESS SHIELDS	RUBBER APRONS
DRESS SHIELD LININGS	STOCKINET SHEETS
BABY PANTS	RUBBER SHEETS
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SANITARY WEAR	RUBBER SPECIALTIES
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RUBBER DAM & BANDAGES — SHEET GUM
RAND RUBBER CO. BROOKLYN, N. Y. U. S. A. MFRS.

MOLDS

WE SPECIALIZE IN MOLDS FOR
Heels, Soles, Slabs, Mats, Tiling and Mechanical Goods

MANUFACTURED FROM SELECTED HIGH GRADE STEEL BY TRAINED CRAFTSMEN, INSURING ACCURACY AND FINISH TO YOUR SPECIFICATIONS. PROMPT SERVICE.

LEVI C. WADE CO.
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GRANULATED CORK
FOR EXTENDING RUBBER
SOUTHLAND CORK COMPANY
P. O. BOX 868 NORFOLK, VA.

SMALL RUBBER PARTS for WAR CONTRACTS
BLOWN • SOLID • SPONGE
FROM NATURAL, RECLAIMED, AND SYNTHETIC RUBBER
THE BARR RUBBER PRODUCTS COMPANY SANDUSKY OHIO

(Classified Advertisements Continued on Page 320)

REVERTEX CORPORATION OF AMERICA
37-08 Northern Boulevard
Long Island City 1, N. Y.

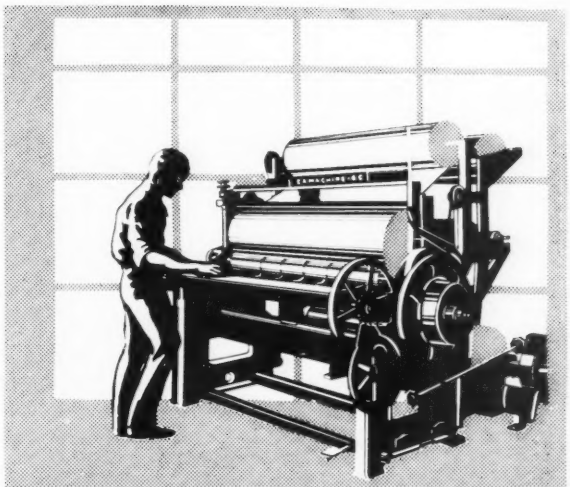
Agents of Rubber Reserve Co.
Washington, D. C.
for

REVERTEX (73-75%)
60% LATEX
NORMAL LATEX

We will compound the Latex allocated to you for war uses and permitted civilian uses to suit your special requirements.

COMPOUNDS FROM SYNTHETIC LATICES

We maintain a fully equipped laboratory and free consulting service



SLITTING AND ROLLWINDING MACHINE
CAMACHINE
6·2C
FOR RUBBER, FABRIC, PAPER, ETC.
CAMERON MACHINE COMPANY, 61 Poplar Street, Brooklyn 2, New York
MIDWEST OFFICE: Harris Trust Building, 111 West Monroe Street, Chicago 3

YARWAY
Improved Type
HYDRAULIC VALVE

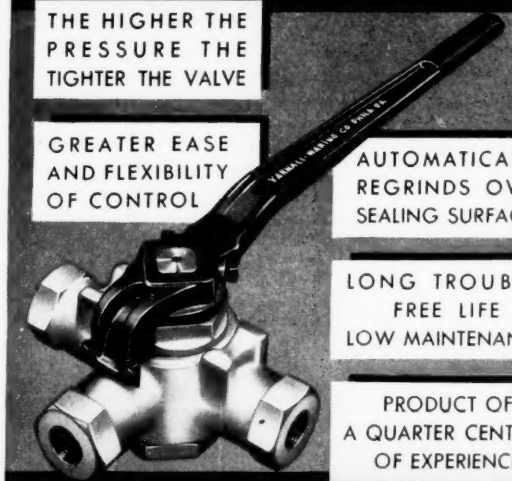
THE HIGHER THE PRESSURE THE TIGHTER THE VALVE

GREATER EASE AND FLEXIBILITY OF CONTROL

AUTOMATICALLY REGRINDS OWN SEALING SURFACES

LONG TROUBLE-FREE LIFE LOW MAINTENANCE

PRODUCT OF A QUARTER CENTURY OF EXPERIENCE



Yarway Single-Pressure Hydraulic Valves are made in straight-way, three-way and four-way types; in five sizes for pressures up to 5000 lb. Also Yarway Two-Pressure Valves in two sizes for pressures up to 4000 lb. Write for Bulletin H-209.

YARNALL-WARING COMPANY
103 MERMAID AVENUE PHILA., PA.

The term
"COTTON FLOCKS"
does not mean cotton fiber alone

EXPERIENCE
over twenty years catering to rubber manufacturers

CAPACITY
for large production and quick delivery

CONFIDENCE
of the entire rubber industry

KNOWLEDGE
of the industry's needs

QUALITY
acknowledged superior by all users are important and valuable considerations to the consumer.

Write to the country's leading makers for samples and prices.

CLAREMONT WASTE MFG. CO.
CLAREMONT N. H.

The Country's Leading Makers

Our Rebuilding Process Removes the Element of Risk

BY THESE FIVE IMPORTANT STEPS

1. INSPECTED
2. DISASSEMBLED
3. REBUILT
4. MODERNIZED
5. GUARANTEED

MACHINERY NEW & REBUILT

"Equipped to Furnish Complete Plants"

L. ALBERT & SON

OFFICES AND PLANTS

TRENTON, N. J. ★ AKRON, OHIO
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Our New Machines

MILLS
MIXERS
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HYDRAULIC PRESSES
SUSAN GRINDERS

New Rubber Spreaders
Churns. Pony Mixers
Saturators

Used—Rebuilt—
Rubber—Chemical and
Paint Machinery

LAWRENCE N. BARRY

41 Locust Street **Medford, Mass.**

HYDRAULIC VALVES

Operating, Globe, Angle, or Check Valves—Hydraulic Presses, Accumulators, Pumps, etc. —For almost any size or pressure.

Dunning & Boschert Press Co., Inc.
336 W. WATER ST. SYRACUSE, N. Y.

AIR BAG BUFFING MACHINERY
STOCK SHELLS HOSE POLES
MANDRELS

NATIONAL SHERARDIZING & MACHINE CO.
868 WINDSOR ST. HARTFORD, CONN.
Representatives
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SPECIALIZING IN
USED MACHINERY FOR THE **RUBBER**
AND ALLIED INDUSTRIES
MILLS, CALENDERS, HYDRAULIC PRESSES,
TUBERS, VULCANIZERS, MIXERS, ETC.
ERIC BONWITT AKRON 8, OHIO

Classified Advertisements

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MACHINERY AND SUPPLIES FOR SALE

FOR SALE: 2—24"x24" Hydraulic Presses, 12" rams; 1—W. S. 15"x18" Hydraulic Press, 10" dia. ram; 2—D. & B. 20½x20½" platens; 1—14"x24" Press, 9" ram; 9—24"x55" Steel Cored Heating Platens; 1—26x66" 3-roll Calender; 1—Farrel-Birmingham 16"x40" Rubber Mill; 4—W. & P. Mixers; Adamson 6" Tuber; Dry Mixers; Pulverizers; Grinders; etc. Send for complete list. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York, N. Y.

ONE USED HYDRAULIC PUMP, COMPLETE WITH RETURN tank, counter shafting, motor and switch. No priority required. $250.00 f.o.b. California. Address Box No. 708, care of INDIA RUBBER WORLD.

PLANT WANTED

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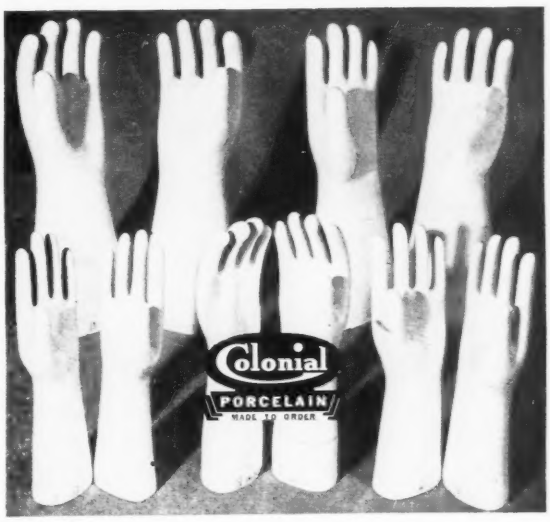

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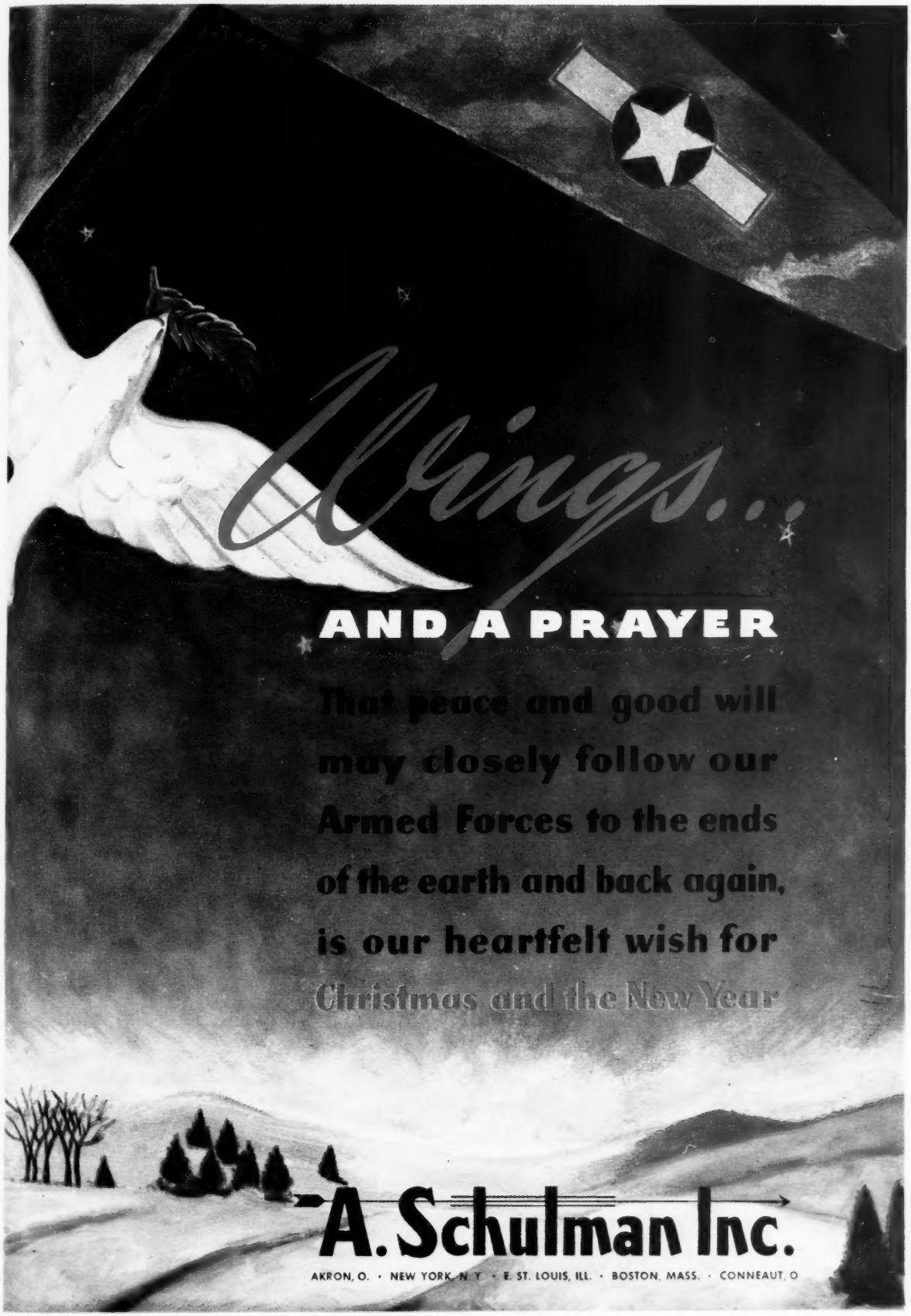
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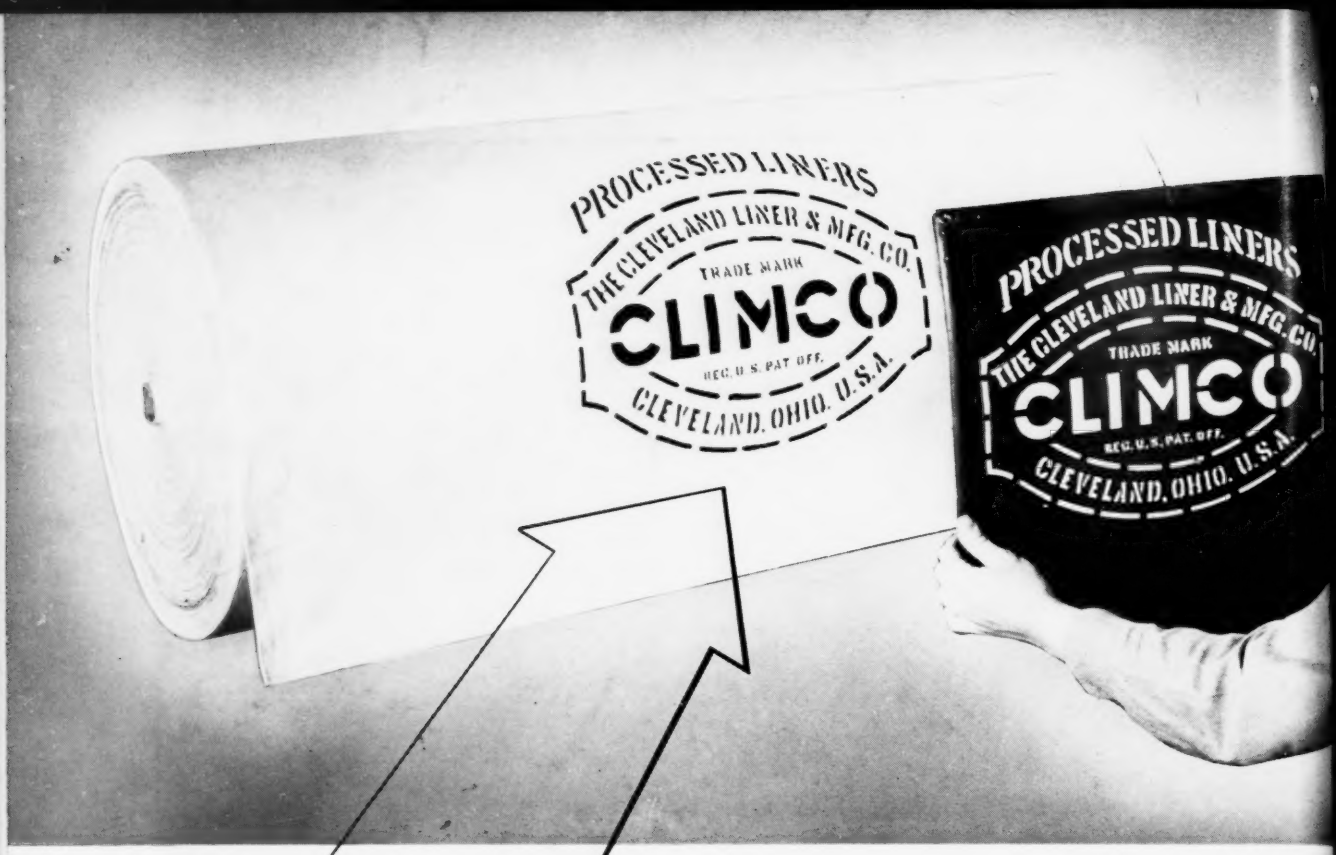

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